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TREATMENT OF GLAUCOMA WITH DI-ISOPROPYL FLUOROPHOSPHATE (D.F.P.)*

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Every ophthalmologist will agree that the treatment of glaucoma is frequently a difficult and harrowing problem. This is attested to by the numerous articles published every year dealing with the different aspects of this serious condition. The signs and symptoms of glaucoma are fairly uniform, but there can be no uniformity of treatment whether medical or surgical. Though numerous operative procedures have been devised for the relief of this ocular hypertension, it has only been within the past few years that drugs other than pilocarpine or eserine have been added to the physicians' therapeutic armamentarium.

Of the newer therapeutic agents, prostigmine acts like its chemical progenitor physostigmine or eserine in inhibiting the hydrolitic action of cholinesterase. Mecholyl, doryl, and furmethide are related chemically and act like acetylcholine in producing parasympathetic stimulation. The fact that none of these drugs is entirely successful in the relief of glaucoma is probably due to the fact that we are treating the patient by reason of objective findings, knowing little, if anything, of the etiologic basis for the disturbance. Previous studies[1,2] have suggested that in patients with glaucoma there is some disturbance of the acetylcholine-cholinesterase balance.

Within the past few months a new miotic has been introduced which gives great promise as a valuable adjunct in the treatment of glaucoma. This is di-isopropyl fluorophosphate (D.F.P.), one of a large group of fluorophosphates, and there is every reason to expect that other and probably more efficient miotics of a similar chemical structure may be introduced. Leopold and Comroe[2,3] were the first to report on the effect of D.F.P. in the normal and glaucomatous eye. This drug is similar to eserine and prostigmine in inhibiting the cholinesterase. It is at least five-and-one-half times more potent and persistent than eserine. This may be due to the fact that its action is irreversible; that is, the cholinesterase is completely destroyed.

Leopold and Comroe have shown that, in the normal and glaucomatous eye, D.F.P. causes prolonged and marked miosis, ciliary spasm, false myopia, and a decrease in the intraocular pressure. This effect is not restricted to D.F.P., but has been reported as the property of other miotics.[4] However, in the work referred to, D.F.P. miosis in the normal eye was found to persist for 14 to 27 days.

The studies herewith reported confirm the findings of these investigators[3] in every detail. As recommended by them, the drug was used in a solution of peanut oil in concentrations of .05, .1, .2 percent. Peanut oil is used as the vehicle, for in an aqueous solution the potency of the drug is lost in about seven days.

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The present investigation was carried out to determine the advantages and disadvantages of using this drug routinely on clinic patients. In order to prove or disprove the efficacy of this drug over other miotics only those patients (with two exceptions) whose glaucoma was uncontrolled by the use of pilocarpine and/or eserine were accepted for trial. Cases in which the tension consistently ran greater than 30 mm. Hg (Schiøtz) were considered as uncontrolled. The greatest percentage of cases fell in the group classified as chronic simple glaucoma. Some of the patients had fairly high tensions (60 to 70 mm. Hg), but no cases of primary acute congestive glaucoma are included in this series. The few cases that were seen responded to the usual miotic therapy.

Procedure

The patients were all examined by me and the only cases rejected for therapy were those with blind painful eyes whose misery the drug might increase, or those who because of infirmities or geographic location could not return for observation every three to six days. The routine procedure was to have the patient's vision and tension checked. One drop of 0.1-percent D.F.P. was then instilled in the glaucomatous eye or eyes. After 45 minutes had elapsed, the tension was rechecked. In practically every instance, within this period of time, the tension was considerably lower. In a few cases there was some pericorneal injection; in patients whose iris was intact the miosis was usually pronounced. The patients were told to discontinue all previous medication and were given .1-percent D.F.P. to use either twice or three times a day, depending on their primary response. They were advised to expect some brow or eye ache and told that it might be severe. Aspirin was recommended for the relief of the discomfort. With few exceptions all patients were examined again in 48 and 72 hours. On reexamination a number of patients stated that they had not used the drug or that they had used it only once since the initial drop.

In practically every instance the tension was lower than it had been initially, and, except for 10 patients who steadfastly refused therapy, all were willing to continue. The seriousness of their condition was explained to them, and it was pointed out that this was the first time in quite an interval that their tension had been controlled. At the second visit, if the tension had been satisfactorily reduced, the patients were instructed to use one drop of D.F.P. either once a day or every other day—if the tension was on the borderline, they were requested to use the drug three times a day. If the patients were insistent that the medicine was too strong, they were given .05-percent D.F.P. Those that complained of loss of vision were shown by means of a -1.00 or -1.50D. sphere held in front of their lens that the decrease in visual acuity was brought about by a change in the refractive error.

At the time of the 72-hour visit one could obtain a fairly good estimate as to whether the patient's condition was controlled or not. At this time the frequency of the medication was again increased or decreased. Those who were still in an uncontrolled state were either given .2-percent D.F.P. to try for another 48 hours, returned to their old miotic, or admitted to the hospital for surgical intervention. Most of the patients were seen at weekly intervals for the first month and then every two to three weeks for the duration of this study. After the first week, most of the discomfort had abated, the blurring of vision was less noticeable, and the patients were, on the whole, content to continue the new therapy. Many

of them were quite pleased to be able to get along on one or less drops a day. This group was instructed to use the medicine at night so that the blurring of vision would be less disturbing.

Results

The results of this study are summarized in table 1. The patients have been divided into two groups, controlled and not controlled. The data on white and colored patients have been separated to determine if there was any difference in the effect of the drug, since it is well known that persons of the colored race are more resistant to therapy. It will be noted that 82 patients have been seen and 122 eyes have been treated. Five of the patients, three white and two colored, had one eye controlled and the other not. The criteria for control was a tension consistently below 30 mm. Hg (Schiøtz)—two tonometric readings of 30 mm. or above during the four months' period placed the patient in the category of having uncontrolled glaucoma.

Several interesting features are presented by these data. It is noteworthy that 57.4 percent of the patients' glaucomatous condition was considered as uncontrolled. Since it had been controlled in none of them by means of miotic or miotics previously used, the results speak well for the drug. Of the eyes that were controlled, 30 percent had a vision of less than 1/60; of the uncontrolled group, however, 50 percent had vision of 1/60 or less. This is not surprising, for in any clinic the patients with absolute or advanced glaucoma represent a fair proportion of the group that is uncontrolled.

In evaluating any therapy one cannot consider the effect of the drug alone, but must also consider the patient's tolerance of it. For this reason the 10 patients who refused therapy were considered as being uncontrolled. This group represents a total of 14 eyes, half of which had a vision of 1/60 or less, and the other half 6/60 or better. In five of the seven eyes with vision 6/60 or better, the tension was satisfactorily reduced following the initial therapy; the tension was still reduced at the end of 48 hours despite the fact that only one or no drops had been used at home. The patients, however, were adamant in refusing further therapy. Those with blind eyes were encouraged but not coaxed to continue D.F.P. Neither approach was of any avail.

Frequency and strength of medication

The distinct advantages of this drug are its relative potency and prolonged action. Leopold and Comroe have pointed out that miosis in glaucomatous eyes is much more prolonged than that produced by any other miotic and that it is even more prolonged in the normal eye. Of the group who were controlled, approxi-

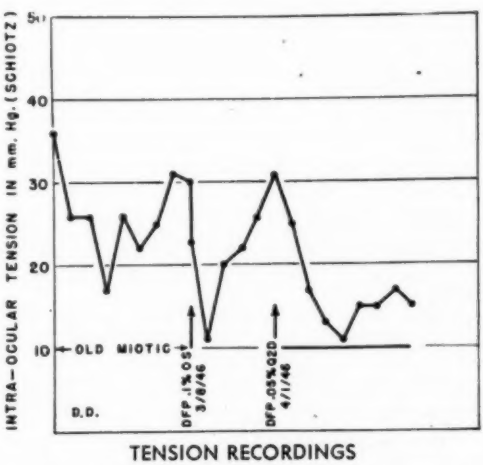

Fig. 1 (McDonald). Colored man, aged 59 years. Glaucoma first diagnosed June 15, 1945. Visual fields show peripheral contraction with nasal step O.S. Prior to D.F.P. therapy, V.O.D. 6/9 + 1; V.O.S. 6/12 + 1 without correction. Vision after four months' therapy, O.D 6/9 + 2; O.S. 6/6 without correction. No significant change in visual field.

mately 63 percent required only one to seven drops of 0.1-percent D.F.P. a week. The prolonged effect of this drug can be

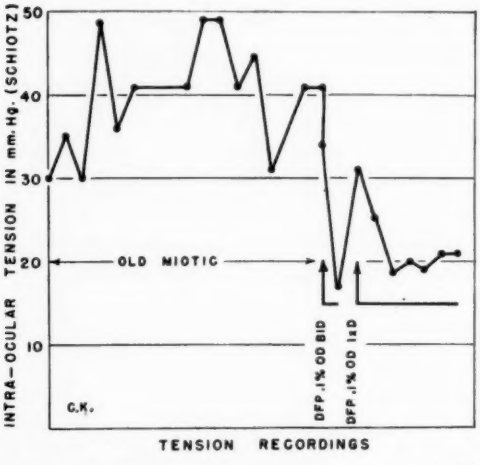

Fig. 2 (McDonald). White man, aged 74 years. Glaucoma first diagnosed May 23, 1944. Elliot trephining O.S. April 13, 1945. Visual fields show peripheral contraction with nasal step. Prior to D.F.P. therapy, uncorrected V.O.D. 6/15; corrected 6/6. Vision after four months' therapy uncorrected, O.D. 6/9—1; corrected 6/9. Visual fields unchanged.

seen in figure 1. This colored patient received one drop of 0.1-percent D.F.P. in his left eye in the clinic on March 8, 1946, but because of the discomfort it brought on he did not use the medication at home. Twenty-three days elapsed before the tension rose to its previous level. He was subsequently placed on 0.05-percent D.F.P. and now tolerates 0.1 percent without difficulty. One drop a week now maintains his tension at a satisfactory level.

This is not always the case, as can be seen in figures 2 and 3. After one week of therapy (fig. 2) this patient was returned to his previous miotic, and within four days his tension had risen to 31 mm. Hg (Schiøtz). He is now satisfactorily controlled with one drop of 0.1-percent D.F.P., daily. The individual whose tension curve is shown in figure 3 did not use the medication after the initial drop in the clinic. When she returned, 96 hours later, the tension had risen but was still lower than it had been for several months. She is now well controlled on one drop a day.

The group who were uncontrolled were naturally all requested to use their drops more frequently. In a few instances, the drug was given more than three times a day; but it was found that, if a patient was not controlled on three drops a day, increasing the frequency was of no avail. This is to be expected because of the prolonged action of the drug.

The most satisfactory strength of D.F.P. to use routinely was found to be 0.1 percent; it was used initially in all cases. The strength was reduced to 0.05 percent if the patients complained too bitterly or increased to 0.2 percent if the tension was not satisfactorily controlled.

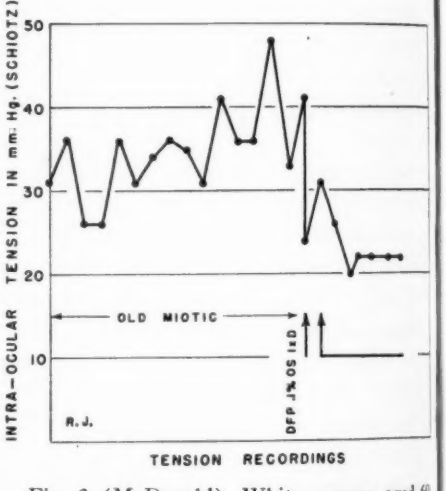

Fig. 3 (McDonald). White woman, aged 69 years. Glaucoma first diagnosed July 17, 1939. Visual field O.S. shows large Bjerrum scotoma. Uncorrected vision O.S., prior to and following therapy, 6/6. No change in visual field.

It was found that reducing the strength of the drug was no more effective than reducing the frequency plus some persuasive argument. Likewise, if a patient was not controlled with 0.1-percent D.F.P., he

was not likely to be controlled with a stronger solution. Of the group of patients now controlled, only one is using 0.2-percent D.F.P. The majority of those that are uncontrolled have been tried with 0.2-percent D.F.P. at some time or other.

Fall in tension

The efficacy of any miotic is determined by its ability to reduce the ocular tension. This reduction in tension must be maintained within the accepted limits if the patient is to continue on medical treatment. In an attempt to determine whether the immediate effect of D.F.P. was of any value in prognosticating whether the intraocular pressure could or could not be controlled with this therapy the immediate drop and 48-hour fall in tension has been summarized in table 1. Perusal of these figures shows that there are no significant differences for the two races in either the controlled or uncontrolled groups. It is obvious that for all groups the tension was lower after 48 hours of therapy. As is the case with other miotics, the initial drop was frequently precipitous and then, over a period of a week or so, the tension would gradually rise—in the controlled cases to a level in the low twenties; and in the uncontrolled cases, although not under 30 mm. Hg, in most instances to a level considerably lower than before. Figures 4 and 5 show the characteristic reduction in tension that has been maintained in the group that has been controlled. Figure 6 shows the precipitous drop in tension in response to both mecholyl and prostigmine and to D.F.P., yet, despite all therapy, including operation, the tension rose to an abnormal level.

TABLE 1

Data on 182 patients receiving D.F.P. therapy

	No. of Patients*	No. of Eyes	Vision less than 1/60	Refusing Therapy: Pts.	Refusing Therapy: Eyes	Refusing Therapy: Vision less than 1/60	Previous Glaucoma Operations	Aphakic: Pts.	Aphakic: Eyes	Drops per Week: 21	Drops per Week: 14	Drops per Week: 7	Aver. Init. Drop	Aver. 48-hr. Drop
Controlled														
White	26	41	15				12	9	11	5	11	25	12.1	18.7
Colored	16	29	6				9	3	5	3	7	19	9.2	15.9
Total	42	70	21				21	12	16	8	18	44		
Not Controlled														
White	25	34	20	6	8	5	24	3	3	12	21	1	10.8	16.3
Colored	10	18	6	4	6	2	14			13	5		10.7	12.6
Total	35	52	26	10	14	7	38	3	3	25	26	1		

* This column does not include the five patients in whom one eye was controlled and one was not.

Rise in tension

Eserine and prostigmine are known occasionally to cause a rise in tension in the normal and the glaucomatous eye. This may be caused by the vasodilatory effect of these drugs. Since D.F.P. is a much more powerful inhibitor of the cholinesterase, it might be expected that this would be noted more frequently. In the control group, seven eyes showed an initial rise in tension of 3 to 7 mm. Hg (Schiøtz); all of this group, however, showed a satisfactory drop in tension at the end of 48

hours. In the uncontrolled group, 10 patients showed an initial rise of from 2 to 35 mm. Hg (Schiøtz), and only one of this group showed an appreciable drop below his initial tension within 48 hours.

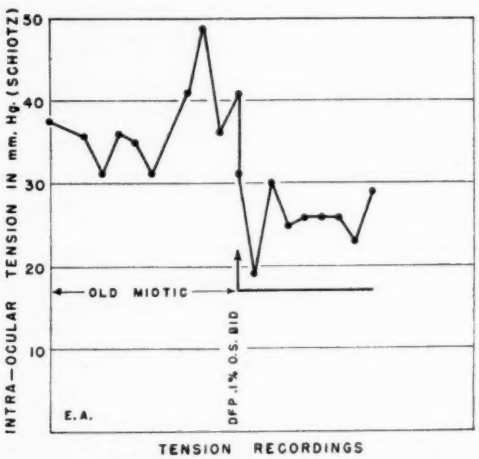

Fig. 4 (McDonald). Colored woman, aged 65 years. O.S. enucleated following glaucoma surgery in 1934. Glaucoma first diagnosed in O.D. February 14, 1934. Visual field shows small central island. Prior to therapy uncorrected and corrected V.O.D. 6/30+1. After four months of D.F.P. therapy corrected and uncorrected vision, 6/15. No change in visual field.

The significance of this will be discussed later.

Aphakic glaucoma

Of the entire group, the 15 patients with aphakic glaucoma were the most satisfactory to treat. This was so for several reasons. First, they seldom complained of discomfort. Leopold and Comroe[2] have pointed out that the probable reason for this is that the zonule is not intact, and they have also ingeniously surmised that the absence of pain supports the Tscherning theory that the fibers are stretched from ciliary spasm. Secondly, since accommodation is absent, these patients do not complain of blurring of vision. Lastly, the results have been uniformly successful in the uncomplicated cases. The tension record shown in figure 7 is characteristic of this group. This patient developed glaucoma following an intracapsular cataract extraction and was admitted to the hospital for a cyclodialysis. When placed on D.F.P. the tension was immediately reduced. A cyclodialysis was performed when the tension was lowered. Following operation the tension rose to its original pre-D.F.P. level, and the drug was tried again with a satisfactory response. In order to insure that this reduction was not a delayed response to the operation, all medication was stopped for one week whereupon the tension rose again. It is now satisfactorily controlled by the use of one drop of 0.1-percent D.F.P. every other day.

As to the three failures, one patient had had a traumatic cataract removed eight years previously, the eye was blind, and there was a marked bullous keratitis. Another patient had had a cyclodialysis; when seen, the chamber was partially

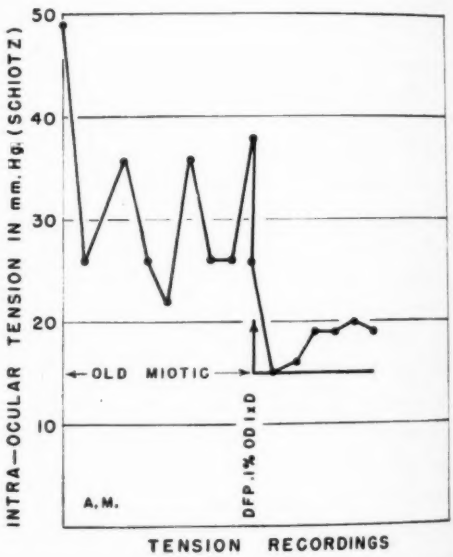

Fig. 5 (McDonald). White man, aged 53 years. Glaucoma first diagnosed in 1935. Elliot trephining O.S. April 25, 1938. Visual field shows large Bjerrum scotoma O.D. Prior to therapy, corrected V.O.D. 6/21; V.O.S. nil. After D.F.P. therapy corrected V.O.D. 6/15—1. No change in visual field.

filled with blood and exudate. The third patient had had a secondary glaucoma with a dislocated lens; when seen, both pillars of the iris were incarcerated and the wound was bulging.

Causes of Failure

All the cases have been reviewed critically to determine if there is any common denominator by means of which one could predict success or failure of the drug. As is frequently and unfortunately the case in a large series of clinic patients, the records are not complete enough to evaluate each case thoroughly—postoperative notes are incomplete, visual fields are not reliable, and there are other omissions. Unfortunately, facilities for the gonioscopic examination of all these patients were not available. Visual fields, although taken, were sometimes missing, and differences in their recording did not permit satisfactory comparisons.

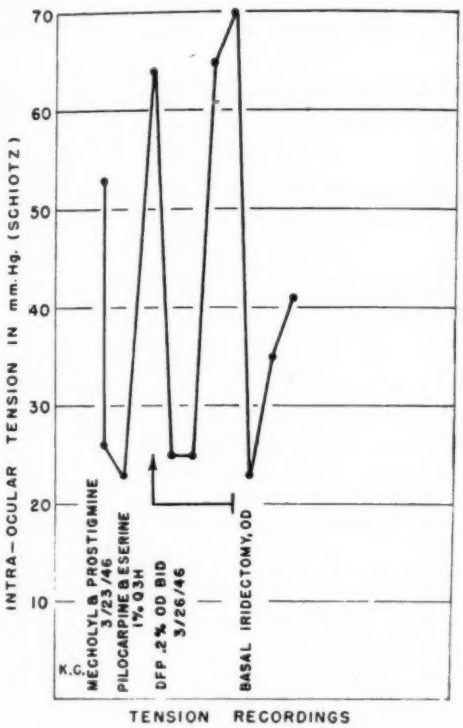

Fig. 6 (McDonald). White woman, aged 65 years. Glaucoma first diagnosed January 26, 1946. Basal iridectomy O.S., January 30, 1945. Visual field O.D. small central island. V.O.D. 1/60; V.O.S. nil. Basal iridectomy O.D., March 29, 1946. Patient has not been seen since discharge from hospital.

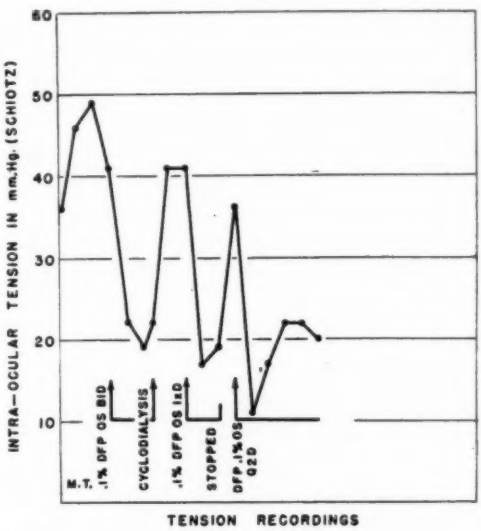

Fig. 7 (McDonald). White woman, aged 65 years. Intracapsular cataract extraction O.S., January 10, 1945. Glaucoma first diagnosed October 8, 1945. Cyclodialysis O.S., March 16, 1946. V.O.D. 6/12; no glaucoma, incipient cataract.

As shown in table 1, 10 patients refused therapy because of the discomfort—a real objection to the use of D.F.P. This obstacle, however, could be partially overcome by having the patient hospitalized for the first few days of therapy, when adequate relief for the discomfort could be provided.

Of the uncontrolled group, eight patients with useful vision were admitted to the hospital and subsequently operated upon. Prior to operation, most of them had had every known type of therapy: mecholyl and prostigmine, furmethide, doryl, and D.F.P. None of these drugs satisfactorily lowered the tension. Of this group the condition of only two has

been satisfactorily controlled by operation; in the others, despite one to three operations on each eye, the tension is still uncontrolled. Two of these patients and one other not yet operated upon, I

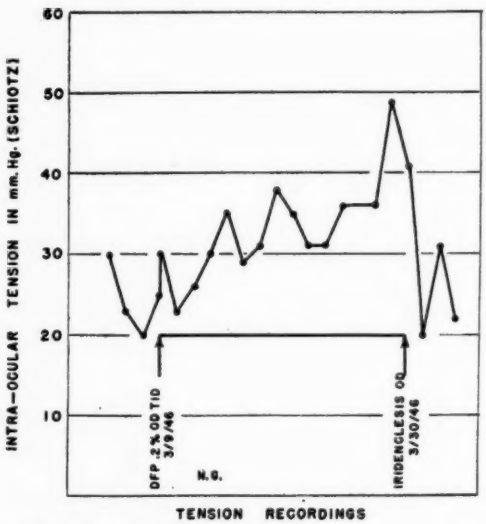

Fig. 8 (McDonald). White woman, aged 60 years. Glaucoma first diagnosed January 30, 1946. Corrected V.O.D. 6/9; V.O.S., light projection. Visual fields show small central island O.U. Patient has not been seen since discharge from hospital.

believe, have been made worse by the use of D.F.P. The patient whose tension curve of the right eye is shown in figure 8 had glaucoma in both eyes. She was admitted for surgery of the uncontrolled left eye. D.F.P. was ordered for both eyes to determine what effect it might have on the tension. Despite adequate miosis, the tension in both eyes started to climb and was relieved only by operation. The patient whose tension curve of the right eye is shown in figure 9 had an essential atrophy of the iris of the right eye. This eye was seemingly controlled with the old miotic; but the left eye, which had undergone a basal iridectomy, was not. The patient was placed on D.F.P. for the left eye and responded to the therapy. To simplify treatment, D.F.P. was ordered for the right eye also. At no time has there been any miosis in this eye, and despite discontinuance of D.F.P. and a return to his old as well as other miotics, his tension in the right eye is still considerably higher than was recorded prior to therapy. The two other cases of atrophy of the iris in this series have also failed to respond to D.F.P. One case of glaucoma secondary to thrombosis of the central retinal vein was unaffected by the drug.

Discussion

Considering the fact that, with two exceptions, only cases which were uncontrolled with the usual miotics are included

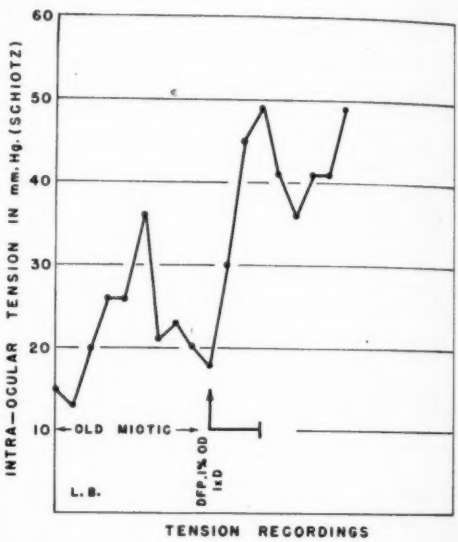

Fig. 9 (McDonald). White man, aged 58 years. Glaucoma first diagnosed September 11, 1944. Basal iridectomy O.S., September 19, 1944. Uncorrected V.O.D. 6/12; O.S. 6/9—1. Visual fields show small central island O.U. Visual acuity has not changed since therapy was initiated. Awaiting operation.

in this series the successful control of 57.4 percent of this group shows that D.F.P. is a valuable adjunct in the medical treatment of glaucoma. Glaucoma patients as a group tend to be somewhat

apprehensive; many of them follow their tensions as religiously as some patients with arterial hypertension. These patients are most grateful for the interest shown in them and for the fact that some form of therapy is now available to control their tension. This is especially so in those who by some misfortune have lost the vision in one eye following one or more surgical procedures.

It is not my purpose to discuss the pros and cons of the medical versus the surgical treatment of glaucoma. I personally subscribe to the school of thought advocating early operation. However, every ophthalmologist has one or more patients for whom, for some reason or other, he would gladly defer surgery if the tension could be satisfactorily controlled by medical means.

This study, I believe, has shown that D.F.P. can be used with impunity on clinic patients, provided the physician prescribing the drug is aware of its advantages and disadvantages. The initial drop in tension is most gratifying, this is frequently precipitous. It is probably due to the fact that the glaucomatous eye is sensitive to acetylcholine.[4] Since D.F.P. inhibits the cholinesterase, the acetylcholine in the eye is allowed to become effective. After the tension has been reduced, the sensitivity to acetylcholine is gradually lost. This probably explains the gradual rise in tension after the first 48 hours of therapy, when the more stable effect of D.F.P. is apparent.

In my opinion it is unwise to keep the tension too low in an eye that has been maintaining an elevated tension. If the tension was below 20 mm. Hg (Schiøtz) when the patients were seen for the second time, they were instructed to reduce the frequency of the instillation of the drops. If the patient's glaucoma is amenable to one to two weeks of therapy one can usually determine whether the drops are required once or twice a day or once or twice a week.

Leopold and Comroe[2] have pointed out that the effect of D.F.P. is much shorter in the glaucomatous eye than in the normal eye. They attribute this to some fundamental disturbance in the acetylcholine-cholinesterase balance in the eye. A few of the cases in this series which have been reported as uncontrolled with D.F.P. have subsequently been controlled when a drop of 20-percent mecholyl was instilled in conjunction with the D.F.P.

Although three strengths of D.F.P. were initially used in this study, I believe that the most satisfactory strength is 0.1 percent. This may, on occasion, have to be reduced for the susceptible patient. Increasing the strength of the solution is seldom of benefit. Of the 42 patients who were controlled, only one is using 0.2-percent D.F.P. The stronger solution has been tried without success in the therapy of many in the uncontrolled group.

As is the case when other miotics are used, there can be marked miosis and still no significant decrease in tension. In attempting to evaluate the reasons for success or failure of this drug the degree of miosis was usually noted. In eyes with an intact iris, except in a few of the cases with iris atrophy, the miosis was usually extreme. The degree of miosis was of no prognostic value as to whether the drug would be successful or not. Eyes that had undergone complete iridectomy often responded to D.F.P. therapy without showing any significant miosis.

This drug seems to be equally effective in reducing the tension in the white and in the colored race. From the data available the frequency of medication required to control the glaucoma was the same in both groups.

The limited experience gained by the

use of D.F.P. in this series of patients has uncovered several facts which would appear to be of value in guiding those who may be using it for the first time. This drug is not a cure-all for glaucoma. It may initially cause a fall in tension; then, after a period of several weeks, the tension may gradually rise, and the glaucoma can no longer be considered as controlled. The drug may have little or no effect on the tension. These are characteristics common to all miotics. In cases of absolute glaucoma, the percentage of successes is much lower than that of the failures; this is to be expected, however, and the drug should not be condemned because it is not effective in such cases.

If the tension does not fall or if it rises 60 minutes after the initial drop, the patient should be carefully watched. If, after a 48-hour interval, the tension has not shown an appreciable fall, some other type of therapy should be instituted, provided one is satisfied that the patient is using the miotic frequently enough and that a supplemental miotic is not indicated. It must also be realized that in certain cases D.F.P. may hasten rather than retard the need for surgical intervention. The arteriolar vasodilation and/or ciliary spasm caused by the drug may swing the pendulum in the wrong direction.

The advantages of the drug, however, are believed sufficient to warrant further clinical studies. D.F.P. is by far the most potent and persistent of the newer miotics. In this series of patients there have been no symptoms of systemic reaction or of local irritation.

It is to be hoped that this new drug will be given additional clinical trial. Many ophthalmologists receive every new miotic with great enthusiasm and try it out on those of their patients who have been uncontrolled with every known form of medical and surgical therapy. When the drug does not work it is soon disregarded and frequently condemned. The treatment of glaucoma cannot be standardized, and the patient's reaction to various therapeutic procedures must be carefully evaluated. It is fairly well established now that there is some disturbance of the acetylcholine-cholinesterase balance in glaucoma. It may be that some patients require a drug which inhibits the cholinesterase as well as one that supplies acetylcholine or its counterpart. One should then be prepared to treat the patients on a sound pharmacologic basis rather then empirically.

Summary

1. In a series of 82 patients representing 122 glaucomatous eyes that were uncontrolled by previous miotic therapy, D.F.P. successfully controlled 57.4 percent of the eyes.

2. D.F.P. has been shown to have the following advantages: (a) It is more powerful than any other known miotic; (b) its action is prolonged, many patients requiring seven or less drops a week to keep the tension controlled; (c) it does not cause a local irritative reaction; (d) it would appear to be especially effective in aphakic glaucoma.

3. The disadvantages in using D.F.P. are: (a) The marked discomfort it may produce during the first few days of therapy; (b) the blurring of vision caused by ciliary spasm; (c) the occasional rise in tension that is believed to result from the arteriolar dilatation and effect on the ciliary body caused by the drug.

4. One cannot prognosticate which cases will respond to therapy and which will not. If the tension has not dropped within 48 hours recourse should be had to other measures.

5. D.F.P. must be used judiciously, and correct dosage determined for every patient.

The author is indebted to Drs. Leopold and Comroe of the University of Pennsylvania for supplying the D.F.P. used in this study and to the Attending Surgeons of the Wills Hospital for the clinical material.

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INDICATIONS AND CONTRAINDICATIONS FOR KERATOPLASTY AND KERATECTOMIES*

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The surgical procedures used for the treatment of corneal opacities are keratoplasty and keratectomies. Whenever possible, keratoplasty is to be preferred, because the visual acuity obtained with this type of operation is considerably better than that which can be obtained with keratectomies.

With keratoplasty, when the transplant remains completely transparent it is not rare to obtain vision of 20/20 or better, whereas with keratectomies there is always a certain amount of irregular astigmatism and varying degrees of haziness with which vision is rarely improved to beyond 20/100. This presentation is based upon the study of more than 600 keratoplasties and over 100 keratectomies performed at the Institute of Ophthalmology, Columbia Presbyterian Medical Center.

Inflammation contraindicates keratoplasty and keratectomies. Whether the inflammation is due to disease (infection, specific lesions, or conditions caused by viruses) or follows trauma, the operation should be postponed until all signs of inflammation have subsided and the eye has remained quiet for at least six months.

In cases of burns caused by chemicals, flame, and molten metals, it is advisable to wait about a year until cicatrization has been completed and photophobia, blepharospasm, and lacrimation have disappeared. Then, when the eye is quiet, the sequela of the injury may be treated either by keratoplasty or keratectomies.

Glaucoma contraindicates these operations. In glaucomatous eyes with corneal opacities, where improvement of vision may be expected by keratoplasty or keratectomies, the glaucomatous state has to be treated first by appropriate operations. When an operation for the control of glaucoma is performed as a preliminary to a keratoplasty, it is advisable to make a very large iridectomy. This procedure will leave the eye in a more favorable condition for the keratoplasty with less danger of

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* From the Institute of Ophthalmology, Columbia Presbyterian Medical Center. Read at the eighty-first annual meeting of the American Ophthalmological Society, at Hot Springs, Virginia, November, 1945.

anterior synechia and recurrence of glaucoma. These complications often lead to nebulosity or opacification of the graft.

In regard to prognosis after keratoplasty and keratectomies, patients may be divided into three main groups:

1. These are very favorable cases for keratoplasty in which a high percentage of clear grafts and considerable improvement of vision may be expected, with final vision averaging better than 20/50 and not infrequently 20/20 or better. They occur in the following ocular involvements:

(a) Central corneal opacities where the transplant will remain surrounded by healthy corneal tissue (fig. 1).

(b) Keratoconus, when vision cannot be improved by regular or contact lenses or when the contact lenses are not tolerated. In these cases the transplant has to be large eonugh to include the conus, otherwise the transplant has a tendency to heal unevenly around the edges and in some instances may protrude, causing pronounced astigmatism or myopia and thus defeating the purpose of the operation (fig. 2).

(c) Interstitial keratitis, when the opacity is not too dense and extensive and the transplant will remain in contact with fairly healthy corneal tissue. To prevent a recurrence of the interstitial keratitis and subsequent nebulosity or opacification of the graft, the infection responsible for the keratitis must be cleared or at least treatment of the infection well advanced before the keratoplasty is performed (fig. 3).

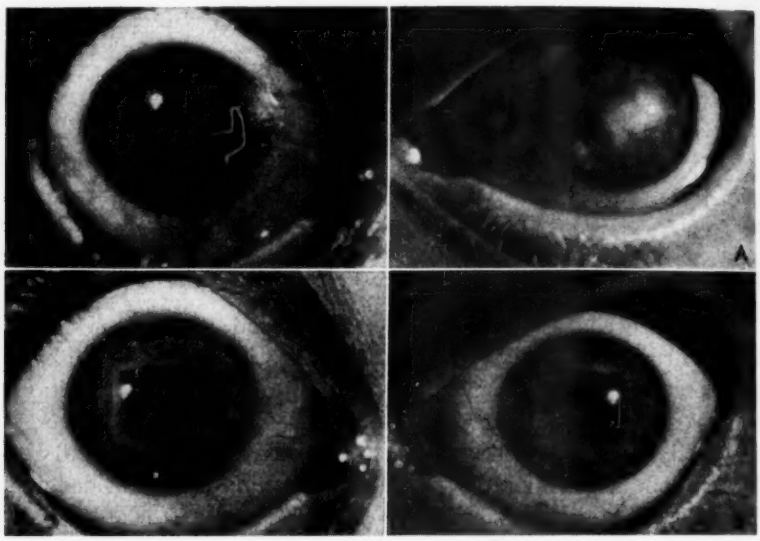

Fig. 1 (Castroviejo). Eyes with central corneal opacities before (A) and after (B) keratoplasty.

2. These cases are less favorable for keratoplasty but still likely to give a high percentage of transparent grafts and considerable improvement of vision. They comprise such involvements as:

(a) Corneal dystrophies (the Fleischer, Haab-Dimmer, Groenow, and Salzmann types) (fig. 4).

(b) Superficial opacities which extend over the whole area of the cornea but in which the epithelium has a healthy appearance, there is not superficial vascularization, and it can be seen either by

Fig. 2 (Castroviejo). Keratoconus before (A) and after (B and C) keratoplasty.

observation with the naked eye, oblique illumination, or examination with the slit-lamp that most of the stroma and the inner layers of the cornea are normal (fig. 5).

(c) Tear-gas burns, when there is no pannus-type superficial vascularization;

Fig. 3 (Castroviejo). The result of keratoplasty in a case of interstitial keratitis.

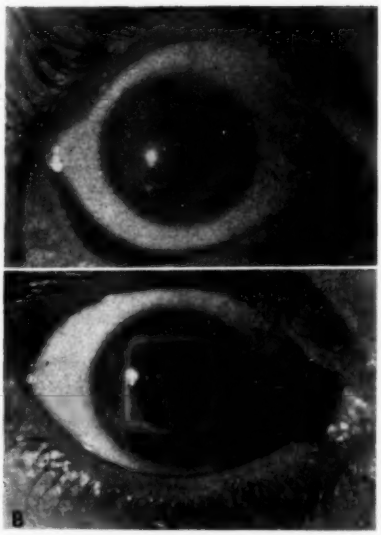

Fig. 4 (Castroviejo). Corneal dystrophy before (A) and after (B) keratoplasty.

the destruction of the cornea includes only a limited area of the superficial layers, and enough healthy cornea remains underneath to nourish the graft (fig. 6).

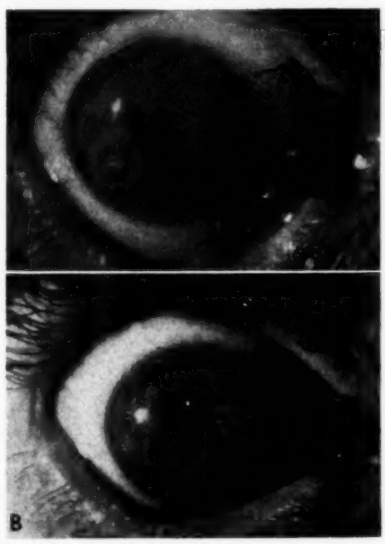

Fig. 5 (Castroviejo). Extensive superficial corneal opacity before (A) and after (B) keratoplasty.

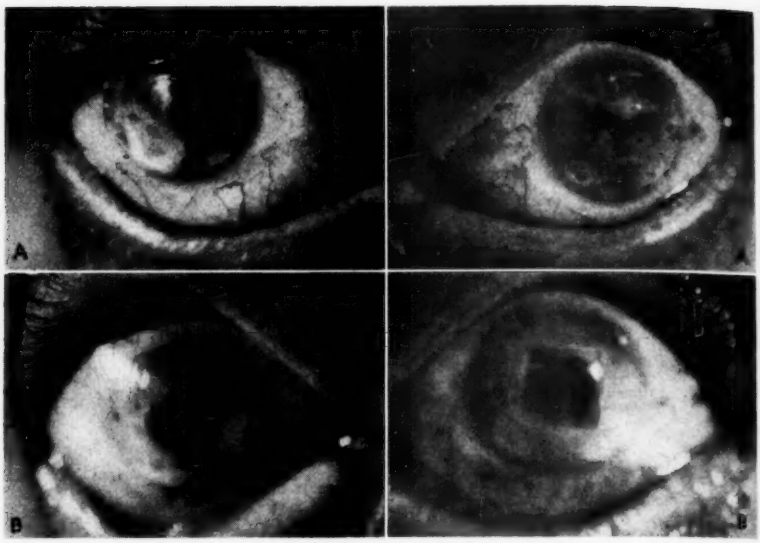

Fig. 6 (Castroviejo). Tear-gas burns of cornea before (A) and after (B) keratoplasty.

(d) Adherent leukomas. Keratoplasty should be preceded by an iridectomy to free the iris from the corneal scar.

(e) Descemetoceles (following corneal ulcers or surgical procedure) in or near the pupillary area, when the whole opacity including the descemetocele may be substituted by a corneal graft (fig. 7).

(f) Interstitial keratitis with more extensive and denser opacity than that already mentioned in (c) under group 1, but still with sufficient permeability in the corneal stroma, giving reason to suppose

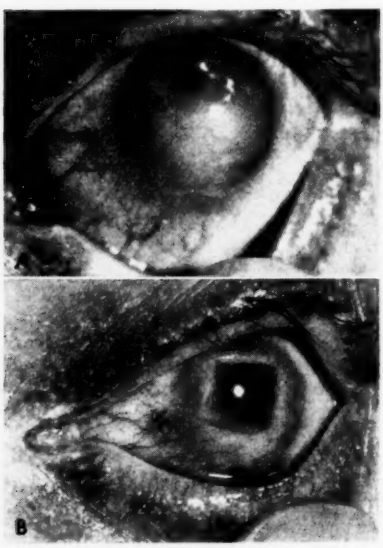

Fig. 7 (Castroviejo). Corneal opacity with descemetocele before (A) and after (B) keratoplasty.

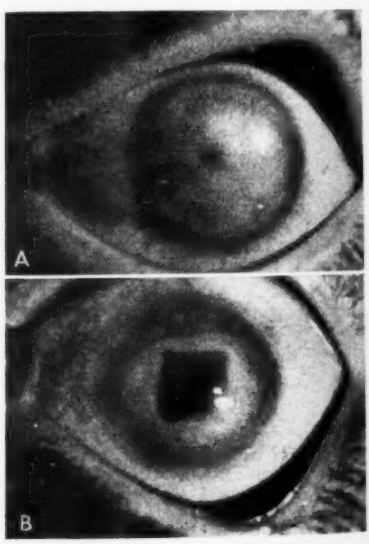

Fig. 8 (Castroviejo). Extensive and dense interstitial keratitis before (A) and after (B) keratoplasty.

that the transplant will remain more transparent than the original opacity (fig. 8).

3. These cases are unfavorable for keratoplasty. They occur in such involvements as:

(a) Corneal scars which, including the pupillary area, extend to the limbus. In these cases the transplant is likely to become vascularized and subsequently nebulous or opaque. In these cases keratoplasty may be performed with guarded prognosis. It should be preceded by a preliminary large iridectomy corresponding to the corneal opacity. If the transplant should become nebulous the eye is generally left in a more favorable condition to undergo a second keratoplasty in the pupillary area because the cornea is usually left with a haziness which is not as dense as the original leukoma (fig. 9).

Fig. 9 (Castroviejo). Nebulous transplant in an example of corneal scar extending to the limbus.

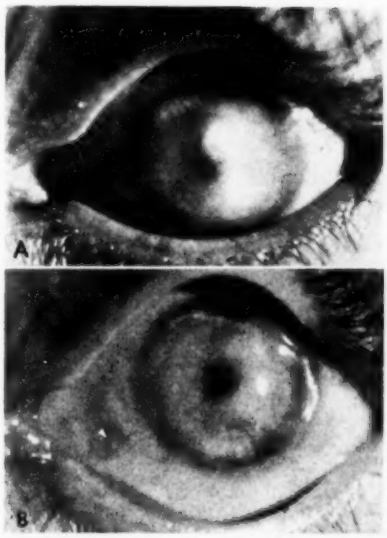

Fig. 10 (Castroviejo). Extensive corneal leukoma before (A) and after (B) partial superficial keratectomy.

Fig. 11 (Castroviejo). Dystrophia adiposa. Before keratoplasty (A). One month after keratoplasty (B). (This graft became opaque several weeks later.) Stages in opacification of the graft after keratoplasty (C and D).

(b) Extensive leukomas in which the transplant will be surrounded in more than one half of its circumference by dense scar tissue. In these cases a partial superficial keratectomy which removes as much as possible of the thickness of the scar may improve vision. If, after kera-

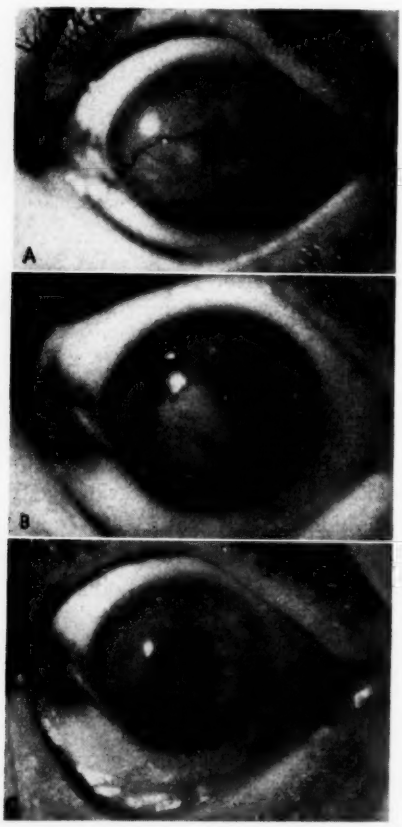

Fig. 12 (Castroviejo). Corneal opacity after dynamite explosion. Before operation (A). After preliminary partial superficial keratectomy (B). After subsequent keratoplasty (C).

tectomy, vision has not improved as much as desired, the eye is left in a more favorable condition to undergo a keratoplasty (fig. 10).

(c) Band-shaped opacity. In these cases the transplant generally becomes invaded by the opacity, and one should preferably perform a partial superficial keratectomy, excising the affected area of the cornea.

(d) Dystrophia adiposa. The transplant is invariably invaded by the dystrophy and becomes opaque (fig. 11). In these cases it is preferable to perform a partial superficial keratectomy as extensive as may be necessary to excise the whole affected area, in surface and in depth preserving as much as possible of

Fig. 13 (Castroviejo). Opaque transplants after keratoplasty in two examples of dense vascularized leukomas of the cornea.

the normal peripheral corneal epithelium, which will serve to epithelize the dissected corneal area.

(e) Deep corneal burns due to tear gas, whether the eye is quiet or suffers from photophobia, blepharospasm, and lacrimation. In these cases it is advisable to carry out a partial superficial keratectomy, with the removal of all of the superficial affected area and to the depth necessary to reach clear corneal tissue without perforation. By means of this procedure enough vision may be obtained to make further surgery unnecessary, but if the improvement of vision obtained is not

sufficient, the eye is generally left without photophobia, blepharospasm, and lacrimation and remains in a more favorable condition to undergo a keratoplasty.

(f) Extensive corneal opacities caused by explosions which leave the cornea with a tattooed appearance. A partial superficial keratectomy is likely to improve vision sufficiently; if not, a keratoplasty may be performed afterward with better chance of success (fig. 12).

(g) Corneal opacities in aphakic eyes, particularly after intracapsular cataract extraction. These cases are unfavorable because the iris, capsule of the lens, or vitreous is likely to become incarcerated in the corneal incision. This complication is very likely to render the transplant quite nebulous or opaque.

(h) Extensive corneal opacities, with superficial vascularization of the pannus type, generally caused by burns (chemical, flame, or molten metals), do not lend themselves well to keratoplasty, and the transplant invariably becomes opaque (fig. 13). These cases are better treated by means of superficial keratectomies. If the opacity does not extend over the whole area of the cornea, the healthy cornea should be preserved, and only the superficial layers of the cornea be dissected, including the opacity with the blood vessels. The operation must be followed by X-ray treatments to prevent the

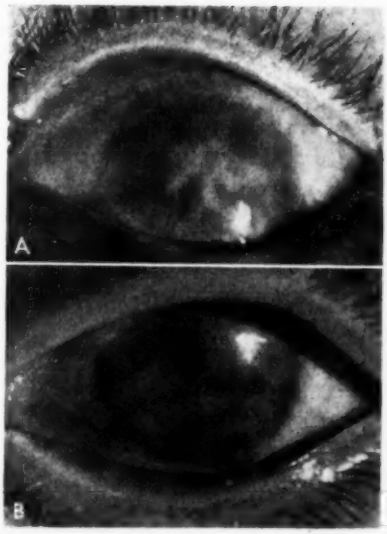

Fig. 14 (Castroviejo). Dense vascularized leukoma before (A) and after (B) total superficial keratectomy.

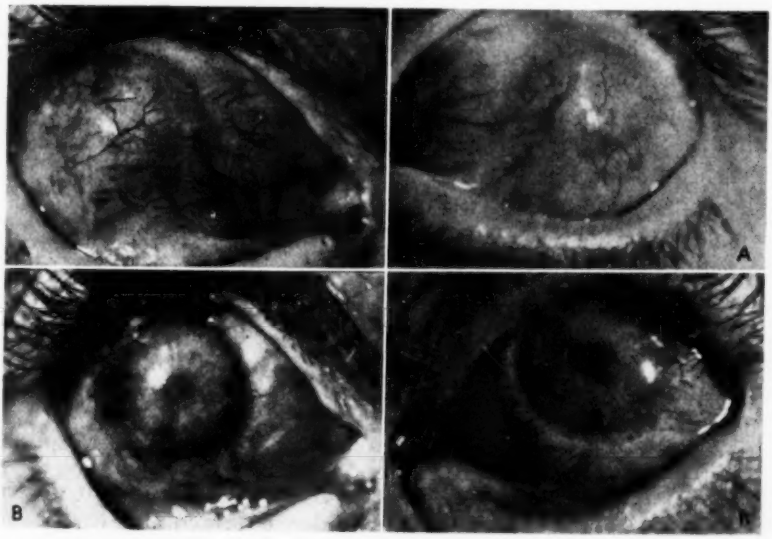

Fig. 15 (Castroviejo). Dense vascularized leukoma and symblepharon before (A) and after (B) total superficial keratectomy with corneo-conjunctival plastic operation.

recurrence of corneal vascularization. If the opacity extends over the whole corneal area, a total superficial keratectomy should be performed followed by irradiation to prevent the recurrence of corneal

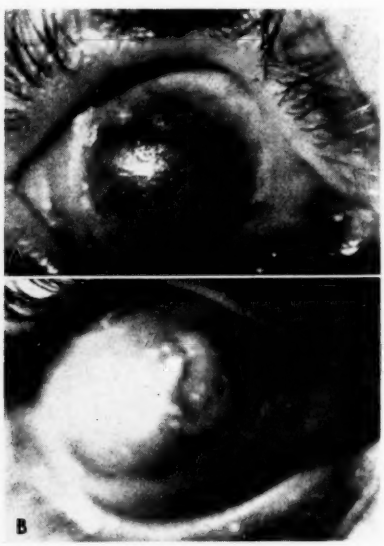

Fig. 16 (Castroviejo). Example of cases suited to corneal surgery. Pemphigus (A). Corneal opacity with calcareous degeneration in a glaucomatous eye (B).

vascularization (fig. 14). If, in addition to an opacity of the cornea, there is a symblepharon, a total superficial keratectomy for visual purposes must be combined with corneo-conjunctival plastic (fig. 15), or corneo-conjunctival plastic and buccal-mucosa implant for the correction of the symblepharon.

Fuchs's epithelial dystrophy, extensive corneal opacities with calcareous degeneration, corneal opacities caused by pemphigus, and corneal opacities with extensive anterior synechiae are not improved by keratoplasty or keratectomies (fig. 16).

Eyes with corneal opacities of many years' standing, particularly when there is a pronounced nystagmus, are not suitable for keratoplasty for visual purposes because these eyes have a high degree of amblyopia. Although the transplant may remain transparent, vision does not improve (fig. 17).

Keratoplasty is contraindicated even in the presence of a favorable eye in patients who during the examination are very uncoöperative, the so-called high-strung type. In these it is reasonable to assume that, on account of poor coöperation, the postoperative recovery will be stormy, with great danger of severe complications such as extensive anterior synechiae and subsequent secondary glaucoma or prolapse of the transplant leading to loss of the eye.

Fig. 17 (Castroviejo). Clear corneal transplant in a case of corneal scar with pronounced nystagmus.

Comment

Keratoplasty and keratectomies are no longer surgical procedures of uncertain results. Sufficient numbers of cases have already been studied to determine fairly accurately in which cases this type of surgery will be helpful. Further study of patients operated upon by keratoplasty or keratectomies will give additional data in regard to the feasibility of employing these techniques in a greater variety of corneal affections, particularly with reference to those which at present are considered unfavorable cases.

635 West 165th Street (32).

Discussion

Dr. William H. Crisp (Denver): I should be obliged if Dr. Castroviejo would tell us something about the very extreme cases of keratoconus, rarely seen, in which there is great bulging of the cornea and some cloudiness of the apex of the extreme cone.

I should also be obliged if Dr. Castroviejo would tell us a little more as to whether one may expect any gain from X-ray treatment of general vascularity from a tear-gas burn many years after the accident occurred.

Dr. F. H. Verhoeff (Boston): I wish to ask Dr. Castroviejo his opinion as to the possibility of recurrence of corneal dystrophy in a graft, and whether in this respect there is any difference in the various types of dystrophy. I know such recurrence has been recorded and I should like to know whether he thinks its likelihood is great enough to contraindicate keratoplasty.

Dr. Ramón Castroviejo (closing): Dr. Crisp has asked if a very extensive keratoconus is suitable for keratoplasty. If the keratoconus is very extensive but one feels that the whole conus can be replaced by a transplant 6½ or 7 mm. in size, the eye is suitable for keratoplasty. If the conus is so large that in order to replace the whole conus, a transplant larger than 7 mm. will be required, the operation is likely to be followed by severe complications such as extensive synechiae leading to secondary glaucoma. In such a case it is advisable to flatten the conus by treating approximately 6 mm. of the center of the conus with a fulgurating current applied with a fine electrolysis needle. After the treatment, the eye has to be bandaged with a pressure dressing and the pressure dressing continued until cicatrization has been completed. This treatment causes corneal opacity of the treated area but the eye is rendered more favorable for keratoplasty when the corneal curvature has been brought within approximately normal limits.

In regard to extensive vascularization of the cornea treated by irradiation, my experience has shown that once the blood vessels have already formed, treatment by X-ray or radium is of no value. Irradiation has to be given before the blood vessels have formed. After keratectomies, X-ray treatment is instituted on the same day or on the day following the operation, when the capillaries are beginning to form and are easily obliterated by irradiation. In this way, vascularization of the cornea is prevented.

To Dr. Verhoeff's remark of the likelihood of the transplant's becoming involved by the cornea of the host affected with a dystrophy, it can be said that in some instances, the dystrophy of the host invariably invades the transplant; for example, in cases of Fuchs's dystrophy and dystrophia adiposa. In other dystrophies, the transplant is likely to remain transparent. Because of the uncertainty in regard to the final transparency of the transplant in cases of dystrophies, these have not been classified in the most favorable group but in the less favorable. However, the transplant is likely to remain more transparent or at least clearer than was the original opacity.

Dr. Verhoeff: But they undergo a recurrence of the same type of opacity?

Dr. Castroviejo: Yes, in some cases the transplant is partially or totally involved by the same dystrophy of the host.

ARSENICAL EYE BURNS*

A CASE REPORT

GEORGE I. UHDE, M.D.†
Portland, Oregon

Lewisite is an arsenical compound, developed toward the end of World War I but never actually used in combat. The lesions are much more painful than those caused by mustard gas. Immediately on exposure to lewisite, there is severe eye pain, blepharospasm, and lacrimation resulting in instant warning to any potential victim. For that reason, there did not occur so many nor so severe burns as on exposure to mustard gas.

PHYSIOLOGIC EFFECTS ON EXPOSURE TO THE VAPOR

The vapor of the pure substance is not lacrimatory but is very irritant to the upper respiratory tract, thus causing a reflex flow of tears. Lewisite vapor, surprisingly enough, does not cause corneal damage, at least in some animals, until large concentrations are reached. Eight patients out of 1,097, or 0.7 percent of the eye, ear, nose, and throat patients, were treated for lewisite-vapor burns at Edgewood Arsenal during the 17 months preceding March 1, 1943. These burns were all very mild.

PHYSIOLOGIC EFFECTS OF A SPLASH BURN

The site of contamination of a rabbit's cornea with a lewisite droplet becomes immediately opaque. The lewisite appears to soak into the cornea almost instantaneously. There is obvious severe pain; the animals frequently squeal. Lid spasm is very severe for 15 to 30 seconds. The pupil may constrict in about two minutes. The corneal epithelium, which is so hazy that it is difficult to make out the iris, begins to loosen in about one to two hours.

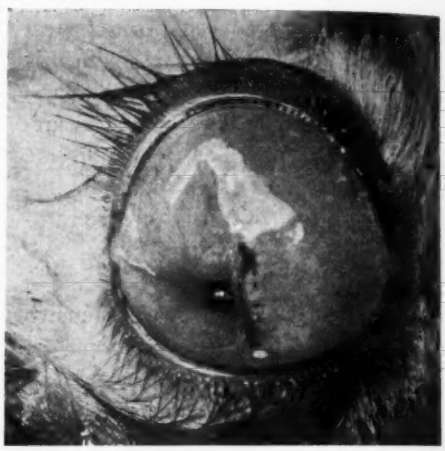

Fig. 1 (Uhde). Rabbit's eye showing severe chemosis one hour after contamination with 0.0002 c.c. of lewisite.

The denuded corneal surface stains with fluorescein. The conjunctiva is severely edematous and contains numerous small hemorrhages (fig. 1). Edema extends into the substantia propria. The whole thickness of the cornea becomes edematous in about seven hours. At 24 hours, there is an iritis with strands of exudate in the anterior chamber. The limbus epithelium with its pigment begins to slide over the denuded corneal surface. Vessels commence to invade the cornea from all parts of the limbus on the sixth to the eighth

* Presented as part of a lecture to classes attending the Medical Field Service School, American School Center, European Theater Operations, United States Army.

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day. The eye usually perforates in two to five weeks (fig. 2).

Report of case

A white man, aged 26 years, was splashed in the right eye with a mixture of arsenic trichloride with small quantities of mercuric chloride, hydrochloric acid, and lewisite. His eye was very painful. He jumped immediately under a shower and his eye was thoroughly irrigated for about 12 minutes. BAL solution or ointment was not available. The patient was hospitalized altogether for about 10 weeks. There is now a dense leukoma and pannus formation over about half the cornea with diffuse nebular haziness of the remaining corneal tissue (fig. 3). There are dense anterior synechiae between the scar and the adjacent iris. The visual acuity is light perception and projection only, whereas the visual acuity in the opposite eye is 20/30.

Treatment. Although most liquid chemicals can be mechanically removed from the eye by immediate irrigation with water, lewisite is one of the exceptions. Lewisite apparently enters into combination with tissue cells so rapidly that it can be removed or destroyed only by chemical neutralization. Fortunately, the latter can be accomplished by means of an antidote developed by the British and called BAL (British Anti-Lewisite).

BAL should be used as soon as possible after injury. If BAL is used within two minutes after contamination, a short period of disability with complete cure can be expected. The period of disability will be increased but complete cure may result if BAL is used within the first five minutes (fig. 4). The period of disability and the final damage increases markedly with any further delay between contamination and treatment (figs. 4, 5, and 6). For instance, in a series of experiments carried out by the author and Lt. Comdr. R. Leishman (R.N.V.R.) with one tube of BAL ointment, treatment at the end of two minutes neutralized the destructive effect of lewisite so that within 10 days, 100 percent of the eyes were normal; with treatment at five minutes, 77 percent were cured; whereas, at 30 minutes the cures dropped to 33 percent. These latter figures make it quite evident that treat-

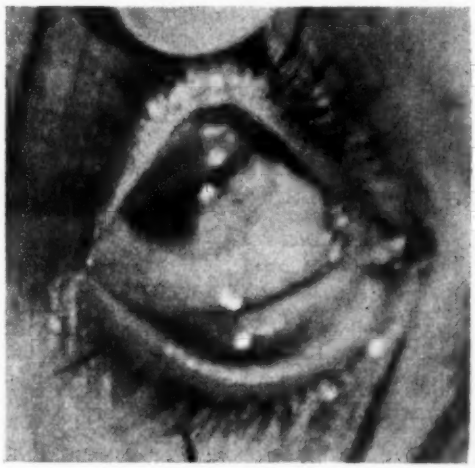

Fig. 3 (Uhde). Human eye splashed with a mixture of arsenic trichloride and small quantities of mercuric chloride, hydrochloric acid, and lewisite, showing leukoma and pannus formation.

Fig. 2 (Uhde). Rabbit's eye contaminated with 0.0002 c.c. of lewisite, untreated, appearance 22 days later (eye perforated on the 14th day).

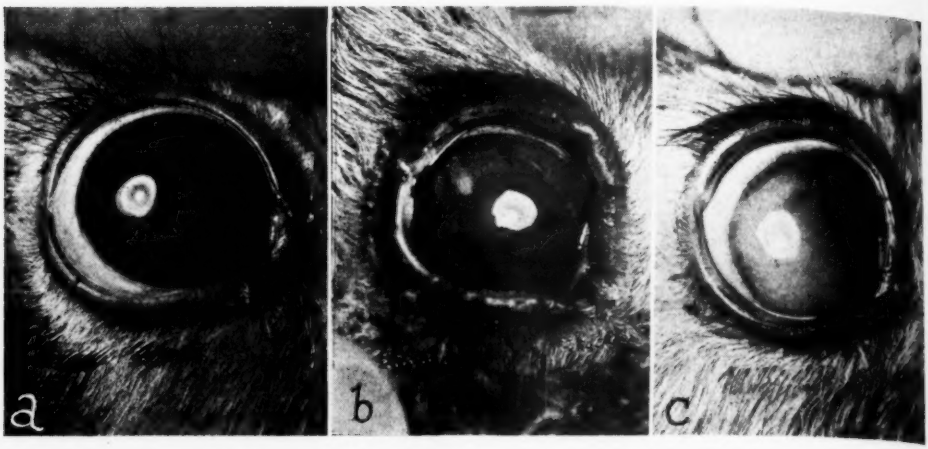

Fig. 4 (Uhde). Rabbits' eyes showing that the period of disability is increased (and the final damage) as the interval between contamination and treatment is prolonged: a, Treated with BAL ointment 5 minutes after contamination with a destructive dose of lewisite, appearance on the 7th day, almost complete recovery. b, Treated with BAL ointment 15 minutes after contamination with a destructive dose of lewisite, appearance on the 7th day, keratitis. c, Treated with BAL ointment 20 minutes after contamination with a destructive dose of lewisite, appearance on the 7th day, severe keratitis.

ment may be worthwhile in an occasional eye even after a fairly long interval. Therefore an injured eye should be treated even if as much as an hour has elapsed after contamination.

BAL ointment replaced the original solution because during an emergency most of the solution is spilled. It is much easier for a soldier to instill an ointment than a solution into his eye, especially if he is in a prone position.

Instructions for the use of BAL issued to each soldier in the European Theater Operations were as follows: In any painful splash of the eye, break off the tip of the BAL tube, place BAL on an index finger, massage the ointment firmly between the lid margins by pulling down

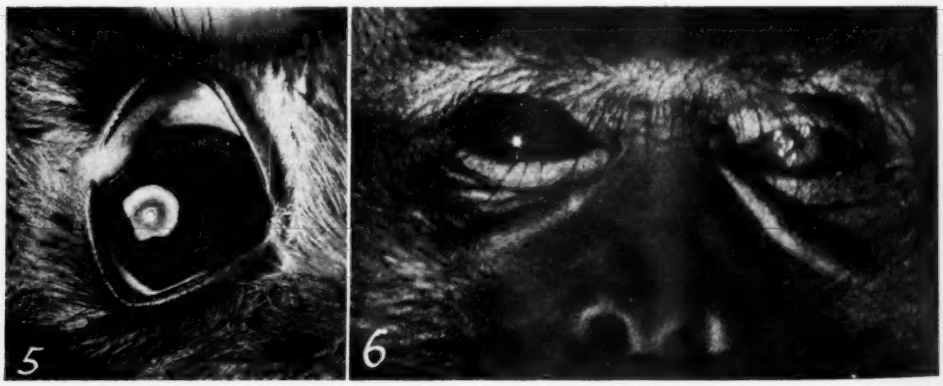

Fig. 5 (Uhde). Rabbit's eye contaminated with 0.0002 c.c. of lewisite, treated 10 minutes later with BAL ointment, appearance 22 days later. Fig. 6, Each eye of rhesus monkey contaminated with 0.0002 c.c. of lewisite, right eye treated 15 minutes later with BAL solution, left eye untreated, appearance at 3 months.

the lower lid so that the ointment goes into the eye. Then place the remaining ointment into the eye, close the lids, and rub the ointment firmly into the eye and lids.

An important problem confronting officers responsible for the treatment and training of personnel was: How is the soldier going to know whether to irrigate or use BAL ointment? The ideal solution would be to have a single ointment equally effective against both mustard and lewisite. Unfortunately, this is not possible at present.

The soldier was instructed to irrigate his eye immediately after any painless, "watery" splash. Immediate irrigation is by far the most effective treatment against a mustard splash.

In any painful liquid contamination of his eye, the soldier was instructed to use BAL ointment.

What about the treatment of a 50/50 mixture of lewisite and mustard gas, which is also painful? It was found experimentally that the best results in such combinations were obtained by the instillation of BAL ointment. The most logical procedure would seem to indicate immediate irrigation to remove the mustard gas and then the instillation of BAL to counteract the lewisite. However, numerous experiments carried out refuted this belief. The best results were obtained by the simple instillation of BAL. There are two possible explanations of this result: (a) BAL is very irritating and produces severe tearing, which may act nearly but not quite so effectively as simple irrigation in the removal of the mustard; and (b) 0.0002 c.c. of lewisite destroys a rabbit's eye, whereas it usually takes three or four times as much mustard to result in similar destruction. In a 50/50 mixture, therefore, the lewisite is doing more than its proportional share of damage. In other words, the amount of mustard present in such a mixed droplet will usually not, by itself, produce any serious effect in any eye. Moreover, Dunphy has shown that BAL ointment alone, if used within one minute, will save a majority of mustard-contaminated eyes, probably, again, as a result of the irrigating effect of the flow of tears caused by the irritant properties of BAL.

What about a painful liquid-tear-gas contamination of the eye? Prof. Ida Mann has shown that BAL ointment does not increase the severity of such a lesion although Bal is very painful in a normal eye.

When the soldier is in doubt he should instill BAL ointment.

To reiterate, the soldier in the European Theater Operations was instructed to irrigate immediately in any painless, "watery" splash of his eye and to use eye ointment (BAL) in any painful splash or when in doubt.

Summary

The clinical features and treatment of arsenical eye burns are discussed and illustrated with photographs and a case report.

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A DEVICE FOR GROUP DEMONSTRATION OF ASTIGMATISM TESTS*

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There is wide variation in the capacity of different individuals for visualization of geometric and other mathematical processes. Even in the most mathematically inclined, the power of visualization is greatly improved by direct experience, or at least by careful study of pictorial illustrations. Any one of these contacts demands thought as well as vision, but mere verbal description reaches the brain a good deal more slowly and vaguely than does pictorial demonstration or solid reality.

Many refractionists have a relatively feeble notion of what goes on in the patient's brain during tests for astigmatism. The nature of tests with astigmatic dials is easier to apprehend than that of tests with the cross cylinders. It was to bring the latter group of tests more effectively to the understanding of workers in refraction that I presented my photographic picturization of the subject to the Washington International Congress of Ophthalmology in 1921.

Several years ago it occurred to me that the new projectors for use with 35-mm. film, with their relatively small objective lenses, should be capable of providing an improved method for demonstrating astigmatic tests, especially those tests in which letters and astigmatic dials are used in combination with cross cylinders. What I had particularly in mind was the placing of minute photographic reproductions of the various charts in the usual position for projection—that is, between the light condenser and the objective lens—and then rotating or "flopping" the cross cylinder, not behind the objective lens of the projector but immediately in front of it—between it and the screen.

The convenient performance of such manipulations demands the setting up of a small apparatus beyond the objective lens, and it was only after much delay that I finally proceeded to work out the construction of a suitable mechanism. This consists of a carrier in which may be inserted a simple cylinder at a selected axis and another cylinder which perfectly or in various degrees of imperfection corrects the astigmatism created by the first cylinder, and then in front of these simple cylindrical lenses a fixed, semicircular metal arm on which can be supported a cross cylinder capable of the same manipulations as are employed in testing a patient's eyes.

The first, posterior, simple cylinder is used to make the projection lantern astigmatic. Take, for example, a plus 0.50D. cylinder at axis 90°, which will render the apparatus astigmatic in the horizonital meridian. The anterior simple cylinder may then be primarily of either inadequate, adequate, or excessive strength and may be placed at any incorrect or at a finally correct axis. The cross cylinder on the metal carrier is flopped into the usual two positions in testing for amount of cylinder, or the usual two positions in testing for axis of cylinder. The primary astigmatic effect upon test letters or upon astigmatic dials will be first projected on the screen, and the effect of partial or of exact correction or of overcorrection can be shown, either with the anterior simple cylinder or with this in combination with the manipulations of the cross cyl-

* Read at the eighty-first annual meeting of the American Ophthalmological Society at Hot Springs, Virginia, November, 1945.

inder. Or the cross-cylinder test for correct axis may be carried through all the manipulations used upon the patient, varying the position of the more or less correcting simple cylinder and displaying, in accordance with the rules of the game, the effect of the changing positions of the cross cylinder.

Apart from the irregularities of the human eye, certain optical complications of the use of the projection lenses interfere moderately, but only moderately, with the complete accuracy of the scheme. However, its effect is close enough to accuracy to allow of furnishing an excellent illustration of what is seen by the patient in the various tests. It is my thought that, in institutions where the formal teaching of refraction is undertaken, much might be gained for graphic presentation of the subject to groups of students. My own apparatus is crude but sufficiently effective to serve the purpose.

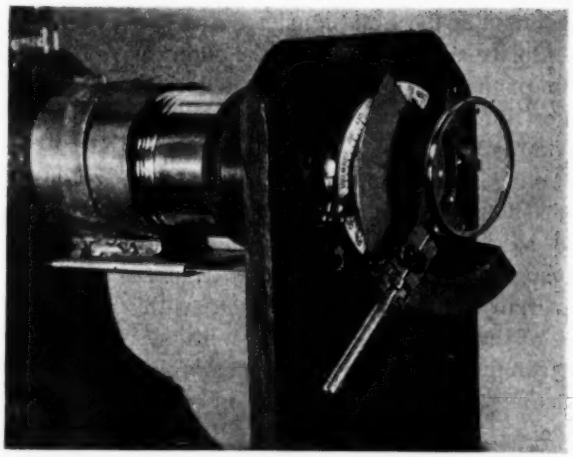

Fig. 1 (Crisp.). A device for group demonstration of astigmatism tests.

(The author personally demonstrated upon the screen, using an S. V. E. 35-mm. projector, the various manipulations referred to in his paper.)

530 Metropolitan Building (2)

Discussion

Dr. John Green (St. Louis): The present wide popularity and almost universal use of the cross cylinder by American ophthalmologists is due, in very large measure, to the enthusiastic advocacy by Dr. Crisp of the unique value of the method in insuring high accuracy in the subjective measurement of the refraction. His careful descriptions of the technique, supplemented by drawings and photographs, have made the practical steps in the process completely understandable.

Dr. Crisp states that "many refractionists have a relatively feeble notion of what goes on in a patient's brain during tests for astigmatism." I am convinced, too, that ignorance of what goes on in the patient's eye during manipulations with the cross cylinder is fairly widespread, and this despite the clarification of the subject by both Jackson and Crisp.

I am not entirely in agreement with the author's statement that "the nature of the tests with astigmatic dials is easier to apprehend than that of tests with the cross cylinder." This view may be valid when dealing with keen and highly intelligent patients. Given a patient with a not too bright mentality (a little above the level of Mortimer Snerd but below that of Charlie McCarthy), it has seemed to me that I have to devote an unconscionable amount of time in attempting to get consistent answers to the query "which are the most distinct lines in the chart?"

I use a modification of Lancaster's chart in the form of a fan, with the lines at 10° intervals (21 radii in all), and I have

my nurse at the first signal from the patient place a black pointer at the outer termini of the radii primarily selected. After a rest interval (with the patient in semidarkness and suitably fogged) reëxamination will sometimes yield answers inconsistent with those given primarily.

I have found it useful (though time consuming) to dislodge the patient from his chair and to walk him up to within 5ft. of the chart while I deliver a little lecture on the beauties of the astigmatic chart when all the lines are uniform in appearance.

No one can deny the beauty of Dr. Crisp's demonstration, which he has devised for group instruction. Might it not also be used as a preliminary exercise for patients about to undergo the test? The demonstration could be conducted by the technician, so that the patient thus instructed would be reasonably familiar with the changes wrought in test letters and astigmatic charts when seated at the test range.

I hope Dr. Crisp may develop his device to illustrate pictorially the vagaries and aberrations of the accommodations, disregard of which is all too common in the hurried and mass refractions of busy offices and busier clinics.

Dr. Walter B. Lancaster (Boston): I think the method of projection is very valuable, and I used the method of projection before this Society some years ago in demonstrating astigmatism with a projector. What I wish to call attention to today is the fact that most of the methods used are qualitative and not quantitative. I mean by that, the aberration produced on these letters by an 0.25D. cylinder is not quantitatively comparable to that produced in the human eye. Many years ago Hess published some photographs of pages of print as they appeared to the camera made astigmatic with a cylinder lens. I do not remember what strength cylinder he used, say 0.5D., and the print was almost illegible. We know very well that 0.5D. before the normal human eye does not produce any such illegibility. I think Dr. Verhoeff also reproduced some print with a camera made astigmatic but without making quantitative comparisons.

I showed before this Society, when Dr. Prangen was presenting a paper on the conoid of Sturm, the method of projecting the conoid with a lantern, and showing the amount of astigmatism produced by a small astigmatic lens, 0.25D. In my paper before the Academy in 1915, I went into the question of photographing the test objects with a camera made astigmatic, and I should like to show the results.

In the figure, p is the pupil or aperture; r is the retina = the focus of the emmetropic eye; f is the focus when −0.25D. cylinder is added; d is the diffusion circle (line if the cylinder is used) on the retina. The magnitude of the blur depends on three things: (1) on the size of the pupil; (2) on the ratio the distance from the retina (where the blur circle is) to the focus bears to the distance from the pupil to the focus (this ratio is df : pf); and (3) on its effect on the magnification of the image by the lens system—if the system magnifies five times as much it will tolerate five times as large a diffusion circle with comparable blurring effect.

df is the distance in millimeters of the focus behind the retina when the eye is made hypermetropic by a minus lens, in this case −0.25D. cylinder. It is calculated as follows: The focal length of the eye when the focus is on the retina may be taken as 22 mm. = 45.45D. When the −0.25D. cylinder is added this becomes 45.20D. = 22.12 mm. The new focus is therefore −0.12 mm. back of the retina,

df = 0.12. The ratio of df to pf is 0.12 : 22.12 = 1 : 184.

In the case of the camera, the focal length (if a 6D. lens system is used) is 166.7 mm. When −0.25D. is added, this becomes 5.75D. = 173.9 mm. The value of df is 173.9 −166.7 = 7.2; df : pf = 7.2 : 173.9 = 1 : 24.

Thus the blur in the eye is 1/84 of the pupil diameter 4, which equls 0.021 mm. The blur in the camera is 1/24 of the aperture; if the aperture is 20 mm. the blur equals 0.833 mm. The blur circle (line) is 40 times as large in the camera as in the eye, supposing apertures of 20 for camera and 4 for eye. How much should we allow for magnification of image? The image size for an object at a given distance depends solely on the distance from the nodal point to the retina or film. In the eye it is 17 mm. from nodal point to retina; in the camera it is 167 mm. from nodal point to film. Thus, the camera image is 10 times as large as the eye image. If one wishes the camera to have a blur circle (or line) comparable to the eye, it must reduce its blur to 10 times that of the eye instead of 40 times. This is readily accomplished by reducing the aperture to one fourth its former size of 20 mm. With an aperture of 5 mm. the camera with a 6D. lens system would give images whose blur would be comparable quantitatively to the blur in the eye with an −0.25D. cylinder. By a similar calculation, quantitative results could be obtained with a camera of a different focal length of lens. The same is true of a lantern.

Why not do this when demonstrating to an audience or class so that they may get a true and correct idea of what a .25D. lens produces in the way of blur?

Dr. F. H. Verhoeff (Boston): For illustrating his paper on astigmatic charts, Dr. Lancaster employed an ordinary photographic lens corrected for aberrations.

In spite of the employment of a corrected lens, Dr. Crisp's apparatus is very useful for instructing a group of students who know little about the subject of refraction. It would be a difficult matter to construct an apparatus that would simulate the optical defects of the normal human eye. I have never thought it worth while to attempt to do so. For each individual student has an optical apparatus of his own, his eye, which we may use for teaching purposes. If its refraction is normal, we can make it abnormal as desired by means of spheres and cylinders.

Dr. W. H. Crisp (closing): The point that Dr. Lancaster emphasized as to the relatively large aperture in the human eye is an important one. Many of you who do photography are familiar with the F system for indicating the relative size of the lens aperture. Suppose you have a half-inch lens and a 5½-inch focal length, that is 5½ divided by 0.5, which gives F 11; while in the human eye suppose you have a 4-mm. pupil and a distance back from the diaphragm to the retina of at most 20 mm. Then you have a ratio of 1 to 5, making F 5, quite a large opening. All these demonstrations are rendered somewhat unsatisfactory by the fact that we get a very much greater difference in the camera than in the human eye. In other words, in this respect the human eye is a more beautiful optical apparatus than the camera, although the camera is better in other respects.

I have here a supplemental note with regard to the apparatus. Tried on different lanterns, one becomes conscious of some differences of effect as between different projectors. With a high-class anastigmatic lens, the effect may show less satisfactorily than with a cheaper outfit. The effect on the projection of certain astigmatic dials is at times almost as paradoxical as that of astigmatic dials on some

patients. Used with the letters, however, it demonstrates some of the difficulties which patients experience in answering questions.

Some letters, on account of their shape, are so distorted as to suggest a somewhat different judgment on the part of the patient than other letters, which is in harmony with the fact that, generally speaking, it does not pay to ask the patient to concentrate on a single letter but it is better to have him base his judgment on a survey of a whole line of letters as distorted by the cross cylinder in its two positions. We are also given an illustration of the fact that the patient can sometimes make a more definite decision if he is looking at the larger letters instead of at the smallest letters he is able to read. We also realize the need for instantaneous reversal of the position of the cross cylinder, without an interval in which the patient can be distracted by the more normal intervening appearance of the letters. The device shows fairly well the frequent emphasis on the vertical parts of letters in one position and on the horizontal parts in the other position.

CULTIVATION OF HUMAN TUMOR IN THE ANTERIOR CHAMBER OF THE GUINEA-PIG'S EYE*

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The general pathologist and the worker in the field of cancer research are thoroughly familiar with the experiments of Dr. Harry S. N. Greene, professor of pathology at the School of Medicine, Yale University, who has succeeded in the transplantation and growth of embryonic tissue and various mammalian and human tumors into the anterior chamber of laboratory animals. It is doubtful, however, if the clinical ophthalmologist is conversant with this work. So, because of the opportunities this method presents to study numerous problems of interest to the latter, the writer has asked permission to report a few of the outstanding developments of Dr. Greene's work and to present the results of a small problem undertaken under his guidance.

As early as 1882, Fischer[1] transplanted pieces of rib and ensiform process from human embryos into the wattles of hens, and reported growth of the transplants. Since that time many investigators have attempted, with more or less success, the homologous and heterologous transplantation of different tissues into various parts of experimental animals. After many other approaches to the problem, Greene found that the anterior chamber provided the best site for the study of such transplants, both because of higher percentage of takes and because the growth of the transplant can be watched from day to day with the naked eye and under magnification. The animals used have been rabbits, swine, goats, and guinea pigs. Of these the rabbit, and especially the guinea pig, were found best adapted to this purpose.

Only a few of the interesting developments of this work need be related, but it is desirable to present them because of their intrinsic value and to form the background of the side experiment on the progressive growth of the human tumor tissue in the anterior chamber of the

* Read at the eighty-first annual meeting of the American Ophthalmological Society, Hot Springs, Virginia, November, 1945.

guinea pig, which is the subject of this communication.

Transplantation is performed under local anesthesia, using a few drops of 5-percent solution of cocaine hydrochloride. An incision is made at the limbus above, by thrusting a double-edged knife through this tissue into the anterior chamber. A portion of the aqueous is allowed to escape and a piece of tumor, about 1 mm. in size, is inserted into the chamber by means of a trocar. By gently stroking the cornea this transplant is worked down to the lower angle of the chamber. No sutures are employed, and infection is very rare. An instance of homologous transplantation is that of an adenocarcinoma of the rabbit uterus into the anterior chamber of other rabbits.[2] In such transfers, 90 percent of the transplants take, and growth is usually evident during the second week. The chamber is usually filled by the 30th day. Regression of the growth occurs in 70 percent of the eyes, but in the remainder growth is progressive, and metastases occur after 6 to 8 months. Heterologous transplantation to guinea pigs, goats, and swine has also been effected, utilizing the same inoculation sites, and the tissue has been carried by serial passage for many generations in the foreign host.

As a rule it is possible to tell if a take has occurred by the second week, but at times as long as 110 days are required before growth becomes evident. Growth is manifested by an increase in the size of the transplant and the development of a pinkish color. Occasionally, the anterior chamber is completely filled by the 15th day, but more often 6 to 7 weeks pass before the transplant attains this size. Rarely is growth extremely slow, but in one instance the tumor had increased to only 2.5 mm. in size after a period of 785 days.

At autopsy the findings are consistent: The growth is seen as a pinkish, semi-translucent mass. The fast-growing tumors are attached to the iris over only a small area, resembling a polyp, whereas the slow-growing tumors invade a large part of the iris, replacing the stroma. The cornea is occasionally invaded, and the growth may extend into the vitreous. Microscopically, the heterologous transplants are much like those of homologous transplants. The epithelial cells are identical and show the same tendency of arrangement. No lymphocytic infiltrations and scant changes suggestive of a foreign-body reaction are observed. Results similar to these changes are observed on transfer of a variety of other tumors from the rabbit to the guinea pig eyes.

The success obtained by using the anterior chamber as a transplantation site for heterologous tissues is in sharp contrast to the complete failure of transfer to other bodily regions and requires some comment. In other inoculation sites, the introduction of tissue from a foreign species is followed almost immediately by an intense inflammatory reaction which terminates either in abscess formation or in encapsulation and necrosis of the transplant. On the contrary, no immediate reaction follows the transfer to the anterior chamber. The implant remains without visible change for several days and may even undergo a slight increase in size before vascularization occurs. It seems probable that during this period the tumor stroma, representing normal tissue from the donor, dies and disintegrates. The parenchymal cells, on the other hand, representing essential tumor elements, continue to live, obtaining nutrient from the surrounding media in the manner of a tissue culture. When, eventually, the delayed reaction in the iris occurs, the implant consists only of essential cancer cells which have no species identity, and the reaction is comparatively mild, resulting in vascularization of the graft, rather

than encapsulation, as in other regions.

The ability to survive and grow in the anterior chamber of an alien host is a property common to cancer and embryonic tissue, and this property is not shared by normal adult tissue or benign tumor tissue.

Among many other interesting experiments done by the same investigator[3, 4] were those in which transplantation of heterologous embryonic human and other mammalian tissues into the anterior chamber of guinea pigs and rabbits was successful. This ability to transplant human embryonic tissue to lower animals offers a new approach to many medical problems and is being widely employed in cancer research. Greene transplanted into the anterior chamber, in whole or in part, many individual organs taken from 10- to 30-day-old human embryos, including lung, brain, heart, stomach, intestine, and kidney. The results of brain- and lung-tissue transplantation are especially interesting. For instance, portions of cerebral cortex often grow with well-marked convolutions and gyri, which suggests that such formations are not entirely due to restricted space in the skull.

Certain changes in the eye which were reported in Greene's papers are particularly worth noting. Thus, in some of the eyes containing transplants of acinar-type breast tumor,[2] the cornea ruptured as the result of increased pressure, and the tumor protruded through the perforation. When this occurred, infection and regression often took place. In other instances, tumor tissue extended under the conjunctiva and invaded the vitreous chamber. The iris was always infiltrated with tumor cells, and the ciliary body was usually involved. Whereas the tumor cells extended under the palpebral conjunctiva in the older growths, the muscle of the eyelid was never invaded, nor were metastases found. In the human-fibrosarcoma transplants, invasion of the iris occurred early and resulted eventually in protrusion through the iris, with occupation of the posterior chamber. Sometimes after filling the anterior chamber, partial regression was observed together with survival of cells in a particular portion, so that following a period of regression, renewed growth occurred, and the chamber was again filled with tumor.

In the case of a spontaneously developing skin carcinoma of the rabbit[5] which was transplanted into the anterior chamber of other rabbits, it was noted that the tumor grew rapidly and that glaucoma developed early. This always resulted in premature regression of the tumor. It was also noted in the case of developing embryonic rabbit tissue[4] that regression of the growth followed filling of the chamber, and that this appeared to be the result of progressive diminution of the blood supply incident to increased intraocular pressure. In two other instances, rupture of the chamber in the region of the healed corneal incision developed. In both of these the transplant consisted of developing human feet. Growth was rapid from the first, with elongation of the toes and metatarsals. The shape and structure of the feet were retained until the chamber filled, when deformation of structures occurred. In one case of human fibrosarcoma transplanted to the guinea pig's anterior chamber, interstitial keratitis and glaucoma developed[6] so that by the 220th day the corneal opacity obscured the graft to such an extent that further observation was impossible.

One of the phases of the problem of growing transplanted heterologous tumor tissue which has not been specially considered, so far as is known, is the progressive development of the transplant within the new host. It was, therefore, determined to implant fragments of human tumor tissue—in this case, the fibro-

sarcoma, whose histologic characteristics were known—into the anterior chamber of a number of guinea-pig eyes and to remove the eyes at progressive stages of development of the tumor. It was at first planned to enucleate the eyes at stated intervals of time, but it was found that the rate of growth was not predictable nor regular, because of factors not too well understood. Therefore, it was found better to remove the eyes when the visible growth had progressed to appreciable differences of size, and to disregard the time factor.

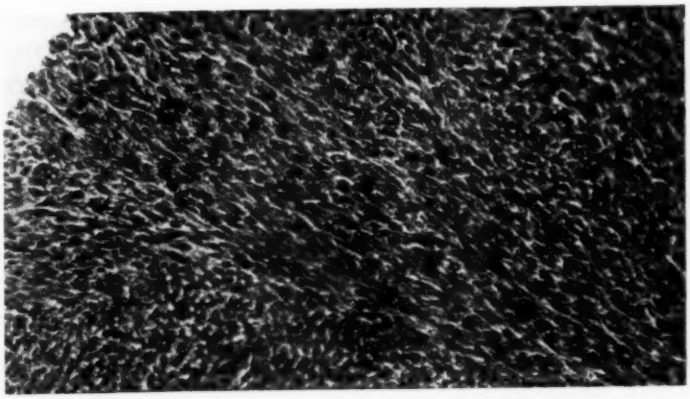

Fig. 1 (Blake). Section of fibrosarcoma from human breast.

The tumor chosen for study was a fibrosarcoma removed in March, 1940, from the breast of a woman aged 20 years. It has been transplanted through many generations in the anterior chamber of the guinea-pig eye (fig. 1). The cells of this tissue are moderately large, with large nuclei, generally elongated, and with considerable intercellular substance. The cells show a pronounced tendency to arrangement in fascicles, some of which surround blood vessels. The fascicles cross and interlace feebly.

After the transplant was introduced into the anterior chamber, it remained without visible change for from a few days to two weeks. At this time it assumed a pinkish hue, indicating the development of newly formed blood vessels. The tumor then increased in size, sometimes rapidly, sometimes more slowly, until it finally filled the anterior chamber. At this stage there was seen a regression of the tumor, or increase in size, which finally eroded the cornea, and the growth appeared as a fungating mass.

The implant always attached itself to the iris, and when vascularization developed, it arose from this structure. The invasion of the iris was rapid, the latter becoming considerably thickened and swollen. If the guinea pig was heavily

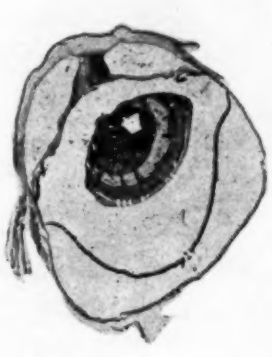

Fig. 2 (Blake). Early growth of implant into anterior chamber of guinea-pig's eye.

pigmented, the iris pigment proliferated and became part of the new growth, being more apparent in the posterior portion of the tumor, in closest proximity to the iris.

Figure 2 shows an early growth of the implant, which in this case did not

Fig. 3 (Blake). Polypoid growth arising from iris of guinea-pig's eye.

reach the angle of the anterior chamber but evidently became caught between the iris and the cornea. Anteriorly, Descemet's membrane is still intact, but in places the endothelial cells are lost. The substantia propria is not invaded. The principal mass is sarcomatous tissue that resembles the original tumor in all respects. At one point, posteriorly, the involved iris has come into contact with the lens capsule, a portion of which can be seen broken off and adherent to the tumor cells. There is inflammatory reaction in the lens, and the fibers are separated by leukocytes and lymphoctes. There is some free blood in the posterior chamber.

Fig. 4 (Blake). Bilobed tumor of iris of guinea pig.

Figure 3 is a good illustration of the manner in which a rapidly growing implant springs from the iris in a polypoid mass. The iris on one side of the section is normal, whereas on the opposite side one sees the tumor arising from the iris near the angle, coming into contact with the cornea at one point, and extending slightly beyond the pupillary border. A small strip of Descemet's membrane is peeled off and the tumor cells are beginning to invade the stroma. On the posterior surface, the tumor lies against the lens capsule but has not penetrated this membrane. There is a foreign-body reaction in the iris at the point of origin of the implant.

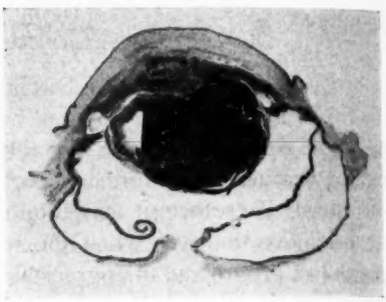

Fig. 5 (Blake). Anterior chamber filled by sarcoma.

In figure 4 there is seen a bilobed tumor mass which arose from the iris on one side and extended around the pupillary border to involve the opposite half of the iris. The tumor mass is highly vascular, and some of the blood-vessel walls are well developed. Again the tendency to strip off Descemet's membrane is seen. There is early invasion of the ciliary body.

Figure 5 shows an eye in which the anterior chamber is entirely filled by the growing tumor cells. The posterior surface of the iris can be plainly followed because of the pigment layer, and the site of the pupil is indicated by the gap between the pigment layer on each side of the figure. The tumor cells have extended through the pupil into the posterior chamber and have destroyed the lens capsule in this area and progressed between the lens fibers. Anteriorly, the cornea is thinned in the central area, and tumor cells have entered the stroma.

In figure 6 we see an eye which is almost entirely filled with the tumor. The cornea is a little thinned but has withstood the pressure of the growing mass unusually well. The sclera, as always, has resisted invasion. The lens has been

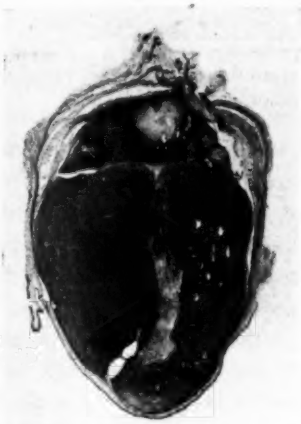

Fig. 6 (Blake). Globe filled by tumor.

displaced backward by the tumor until it is in contact with the sclera at the posterior pole. The retina is edematous and degenerated but not infiltrated with tumor cells. The bundles of tumor cells are characteristic of the original tumor of the breast.

Figure 7 shows a fungating mass in a disorganized globe. Anteriorly, as in every part of the eye, great changes have taken place. At the periphery of the cornea the superficial epithelial cells are keratinized, and the deeper cells edematous. Beneath this, between the epithelium and the stroma, is an extensive hemorrhage. Nearer the center of the cornea, the

Fig. 7 (Blake). Disorganized globe with fungating mass.

tumor cells have invaded the epithelium, and, at the center, they have ruptured through and lie on the surface, mixed with polymorphonuclears. The stroma is swollen, and there are sarcoma cells scattered throughout, with many islands of blood and areas of necrosis. Descemet's membrane has entirely disappeared except for two or three short strands. The iris and ciliary processes are suggested only by pigment streaks, and the tumor fills practically the entire cavity of the globe. A few isolated bundles of lens fibers are found, but the lens has almost completely disappeared. The globe is filled with sarcoma cells, areas of infection,

and hemorrhage. At the posterior pole is a staphylomatous protrusion containing the tightly coiled retina and blood. The external limiting membrane is preserved in places. A portion of the optic nerve is seen at the tip of the staphyloma and is not invaded by tumor cells.

Figure 8 shows a section of the tumor taken from the globe described in figure 7 and is of the same cytologic characteristics as the original implant taken from the patient's breast (fig. 1).

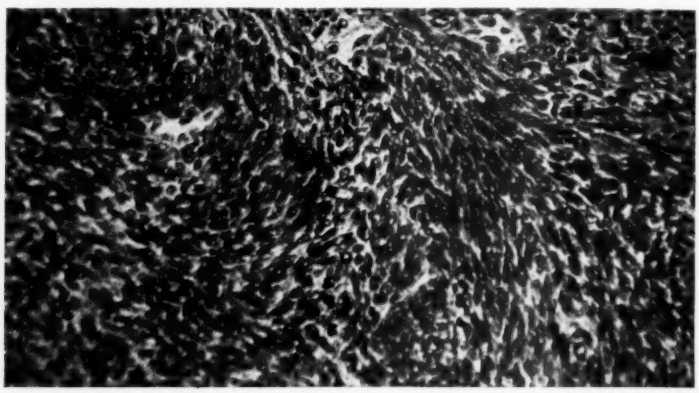

Fig. 8 (Blake). Section of fibrosarcoma taken from tissue from figure 7, showing identity of the original and transplanted tumor.

The purpose of this presentation is not primarily to show the development of a transplant of human fibrosarcoma into the anterior chamber of the eye of the guinea pig, but to call attention to the possibilities of the utilization of the anterior chamber of laboratory animals for various research problems. Since human embryonic tissue will develop in this cavity, it should be possible to study here the growth of different embryonic tissues of the eye, as well as of other portions of the body. The ability to grow tumors arising in the human eye may aid in furthering our knowledge of the pathology of these growths. Such experiments are already under way. The study of pigment formation may be aided by the use of the anterior chamber, for we know that a pigmented sarcoma transplanted into the eye of an albino pig continues to grow pigment, showing that the ability to produce pigment resides in the tumor cells and not in those of the host. It may be that some of the animal parasites will grow in the anterior chamber and afford an opportunity to observe the changes taking place during their life cycle. These and many other possibilities will suggest themselves for the employment of these easily obtained laboratory animals, where changes may be observed without sacrificing the animal until needed, and where, with the naked eye or under magnification, one may follow the changes taking place.

303 Whitney Avenue

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Discussion

Dr. L. T. Post (St. Louis): I am interested in this paper because in my candidate's thesis for the American Ophthalmological Society, published in the Transactions for 1924, incidental to work with the thermophore on which the essay was based, I transferred the so-called Jensen sarcoma into the anterior chambers of white rats and treated it with the thermophore at 160° for 1- and 2-minute corneal applications. In about 30 percent of the cases, the tumor continued to grow, and in most of these, if the tumor had not extended too far, the thermophore destroyed the growth. The principle has had practically no therapeutic application, except in one case of Dr. William Luedde's. The patient had only one eye and many ophthalmologists concurred in the diagnosis of melanotic sarcoma of the anterior segment of the choroid. Since the patient would not consent to removal of the eye, Dr. Luedde used the thermophore and followed the patient for many years thereafter. The last I heard about it, the patient still had the eye, and the growth had regressed. Further studies with human tissue should be made and different types of therapy tried. However, this is not by any means advocating the use of the thermophore in the treatment of intraocular tumors.

Dr. Bernard Samuels (New York): Dr. Blake has called attention to the experimental work that is being done by the general pathologist in the implantation of tumor and embryonal tissues in the anterior chambers of animals. He has given the results of an independent experiment of his own, undertaken for the purpose of observing the manner of growth and regression of fragments of a fibrosarcoma after they had been transplanted into the anterior chamber of guinea pigs. I agree with his theory that those elements in an implanted tumor that represent normal tissue disappear so that only malignant cells are left to propagate. The slowness, that he observed, with which the infiltrating type grew in the iris was probably largely due to the mechanical resistance offered by the normal stroma to the advance of the proliferating tumor cells. In man, slow growth is characteristic of the infiltrating type of a primary malignant melanoma anywhere in the uveal tract. Dr. Blake noted that the pedunculated-shaped implants grew rapidly. This was due to the fact that the tumor cells were disposed in a fluid medium in which the resistance was not so great as in the iris stroma, and, furthermore, the resistance being equal in all directions, the mass assumed a globular form.

There are but two primary intraocular tumors of great importance—the malignant melanoma and the retinoblastoma.

To supplement Dr. Blake's observations, I should like to throw on the screen several slides that demonstrate the behavior, in the early stages, of fragments of primary intraocular tumors in man, once they are disseminated into the cavities of the globe. I should like to call attention also to one slide that shows how lenticular epithelial cells, free in the aqueous over a long period, have been preserved and have proliferated.

Dr. Eugene M. Blake (closing): I should like to thank the discussers for their remarks, and to say one thing that I think is important, and that is that it may be we can use the anterior chamber to determine malignancy. For instance, in a case of sarcoma of the soft palate of a Negro, in which portions of the tumor, implanted in the eye of guinea pigs, died in every instance, but when, within a few months, metastases occurred in the neck and portions of these were implanted in the anterior chamber, they grew in 100 percent of the animals. It might be pos-

sible to divide these tumors into the stage of dependency, when they are dependent on their host for growth, and the stage of autonomy. When they reach the stage of autonomy, they will grow in the anterior chamber of a foreign host, and apparently will not do so in the stage of dependency.

CORNEAL ULCER TREATED WITH STREPTOMYCIN*

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The use of streptomycin hydrochloride in the treatment of corneal ulcers was suggested because of the ability of this antibiotic to inhibit the growth of both gram-negative and gram-positive bacteria. Waksman and his associates isolated two related substances, streptothricine[1] and streptomycin.[2] Streptomycin, obtained from a strain of Actinomyces griseus, is less toxic, and we used this to treat patients with corneal ulcers. Because of the limited supply of streptomycin, only those who had received previous treatment but with unsatisfactory results were classified under the category severe corneal ulcer. In order to test the possible added value of the drug as compared with the results from the usual form of treatment, nine patients with corneal ulcer were given streptomycin as an adjuvant to the routine treatment with atropine sulfate, hot compresses and, occasionally, typhoid vaccine. The control group was 13 patients with corneal ulcer who failed to respond to treatment in the out-patient department and required hospitalization. The severity of their condition was comparable to that of the patients treated with streptomycin.

The criteria were (1) duration of pain; (2) healing time of the ulcer; (3) total days of hospitalization.

Streptomycin hydrochloride† was used in a concentration of 10,000 untis‡ in each c.c of normal salt solution. Two drops were placed in the affected eye every two hours day and night.

CASE REPORTS

Case 1. P. D., a white man, aged 57 years, was admitted on June 29, 1945, because of pain in his left eye beginning five days prior to admission. Vision was 6/15. There was mild edema of the upper lid and severe conjunctival injection of the left eye. The cornea was diffusely hazed throughout, and a corneal ulcer, 3 mm. in diameter was observed at the 2-o'clock position, 1½ mm. from the limbus. The ulcer stained heavily with fluorescein. Slitlamp examination revealed the depth of the ulcerous invasion as one-half the thickness of the cornea. There were numerous folds and wrinkles in Descemet's membrane, especially in the area of the ulcer.

Treatment. The following medication was ordered for the left eye: a 1-percent solution of atropine sulfate, 2 drops three times a day; hot compresses for 20 minutes four times a day; and 2 drops of streptomycin every two hours day and

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* From Wills Hospital and Jefferson Medical College.

† All of the streptomycin used was supplied through the courtesy of Merck & Company, Inc., Rahway, New Jersey.

‡ One unit represents 1 microgram in terms of weight of pure streptomycin base according to the newly adopted plan.

night. By the second day of treatment the ulcer was improved; only its temporal portion stained with fluorescein. The slitlamp examination revealed clearing throughout the cornea with a smoothing of the epithelial folds. There was less pain. On the third day there was much diminished redness of the eye, the pain was gone, and only a small island of the ulcer still stained. On the fourth day the ulcer no longer stained; and by slitlamp examination only a small depression was observed to remain in the mid-portion of the healed ulcer. The use of streptomycin was stopped after six days' treatment. The patient was discharged symptom-free, with vision of 6/12. Three weeks after discharge the patient was seen in the clinic and there remained only a small nebular opacity that appeared to be clearing.

Case 2. T. J., a colored man, aged 53 years, was admitted on July 9, 1945. The patient had been well until three days prior to admission, when he developed lacrimation, photophobia, and pain in the right eye. The vision of this eye was 6/60 corrected to 6/30. Edema of the upper lid and conjunctival injection of the right eye were marked. There was a large ulcer at the 6-o'clock position, 3 mm. in size and 2 mm. from the limbus. Several deep opacities at the limbus, at the 6-o'clock position, were due to a previous perforating injury. Slitlamp examination confirmed the size of the corneal ulcer and showed it to be superficial. The cornea was hazy throughout.

Treatment. Medication prescribed for the right eye was: a 1-percent solution of atropine sulfate, 2 drops, three times a day; hot compresses for 20 minutes, four times a day; 2 drops of streptomycin, every two hours day and night. Two days after treatment was instituted, there were only very small punctate areas of staining present within the ulcerated area, but the pain, most of the lacrimation, and swelling of the lids had subsided. On the fifth day there was no staining, photophobia, or pain. After nine days' treatment with streptomycin, the patient was discharged symptom-free, with the cornea clear except for the deep opacities observed as due to a previous injury. Vision was 6/60 corrected to 6/30.

Case 3. J. D., a colored man, aged 29 years, was admitted on July 20, 1945. Two months prior to admission, the right eye felt scratchy, and a hair was removed; but the symptoms became gradually more severe. The patient was treated as an outpatient for three weeks, but received no alleviation of his symptoms. Vision was 6/15 corrected to 6/9. There was marked epiphora of the right eye, with an edema of the lids that gave the impression of a partial ptosis. Conjunctival edema and injection were likewise severe. The corneal ulcer was 3 mm. in size and was located at the limbus at the 7-o'clock position, surrounded by a hazy infiltration. Slitlamp examination showed that the ulceration extended into the anterior third of the stroma. There were a few folds and wrinkles in Descemet's membrane in the region of the ulcer.

Treatment with a 1-percent solution of atropine sulfate, 2 drops, three times a day; hot compresses for 20 minutes, four times a day; and 2 drops of streptomycin in the right eye every two hours day and night was instituted. On the second day of treatment with streptomycin, the pain was gone and only the central part of the ulcer stained. The injection and edema of the conjunctiva were greatly reduced. Slitlamp examination showed that the edges of the epithelial portion of ulcer had curled inward toward the cornea and had become smooth. By the fourth day the ulcer did not stain, and

the edema and injection were gone. Following seven days of treatment the patient was discharged symptom-free, with vision of the right eye 6/15 corrected to 6/9.

Case 4. J. G., a white woman, aged 52 years, was admitted on October 5, 1945. Since pregnancy at the age of 34, the patient had had poor vision in both eyes. There was bilateral exophthalmos. The patient fell two days prior to admission and broke her glasses. This accident was followed by pain in the left eye. Vision in this eye was limited to perception of hand movements. Superimposed upon a leukoma at mid-cornea of the left eye was an ulceration, 2½ mm. in diameter, which extended into the stroma and was surrounded by an area of scarring. There was a hypopyon, 2 mm. in height. The patient had hyperthyroidism, which could account for the bilateral exophthalmos. Slitlamp examination of the left eye showed a denuded area which extended into the mid-stroma. Surrounding this there was a leukoma.

Treatment for the left eye consisted in: the instillation of a 1-percent solution of atropine sulfate, 2 drops three times a day; hot compresses for 20 minutes, four times a day; and instillation of 2 drops of streptomycin every two hours day and night. After one day of treatment the pain was not so severe, but the staining was still deep. Slitlamp examination revealed, as in the other cases, that the edges of the ulcer were smooth and curled inward toward the cornea, which was in direct contrast to the rough edges that were curled outward toward the conjunctiva of the lids, noted on the first examination. The hypopyon was reduced to 1 mm. in height. Two days later the hypopyon was gone, but the ulcer still stained. There was no pain. A tarsorrhaphy was performed because of the exophthalmos, and streptomycin was continued postoperatively through the opening at the medial canthus. Twelve days after the tarsorrhaphy, the sutures were removed. The ulcer had healed, and the patient was symptom-free. Treatment with streptomycin was continued for 16 days. Vision on discharge was 3/60.

Case 5. P. G., a white man, aged 40 years, was admitted on October 2, 1945. The patient had had a corneal ulcer of the right eye in 1942, no residual scar. Four days before admission, the right eye became red and painful. The vision was 6/21. The right eye showed moderate edema of the lids and marked conjunctival injection. The cornea was hazy. The ulcer involved about one third of the cornea and stained deeply. The hypopyon was 1½ mm. in height. Slitlamp examination revealed that the ulcer extended into the posterior part of the stroma and also that there was a small superficial opacity nasal to the ulcer, possibly the residuum of the ulcer of 1942. Wrinkles and folds were present in Descemet's membrane in the area of the ulcer, and there appeared to be active keratitic precipitates.

Treatment. Medication prescribed for the right eye included: 1-percent solution of atropine sulfate, 2 drops, three times a day; hot compresses for 20 minutes, three times a day; 2 drops of streptomycin every two hours day and night; and 1 drop of 10-percent aqueous neosynephrine, three times a day, was added to the treatment to aid in mydriasis. Following two days of treatment the conjunctival injection was only slight, and the hypopyon was smaller. On the third day, the hypopyon was one half as deep, and the pain was gone. There was continued improvement until the fifth day of treatment when, for the first time, fluorescein was noted in the anterior chamber.

Slitlamp examination showed the ulceration healing from the edges with a deep central channel. The patient did not complain of any pain. On the seventh day, no fluorescein entered the anterior chamber. Slitlamp examination revealed the ulcer to be practically healed except for the small central channel. On the eleventh day the central channel was almost closed. On the thirteenth day the patient was discharged symptom-free with ulcer completely healed. Vision was 6/12.

Case 6. I. S., a white girl aged 17 years, was admitted on August 20, 1945. One week before admission the right eye had become red and painful. Vision was 6/21. There were marked edema of the lids, conjunctival injection, and a ciliary flush. The ulceration involved almost the entire cornea. Slitlamp examination showed the ulceration to extend into the anterior portion of the stroma.

Treatment. The patient was treated with atropine, penicillin drops and ointment, typhoid vaccine, and penicillin, 160,000 units intramuscularly each 24 hours. The corneal ulcer failed to respond to this treatment. Paracentesis was performed, medication with penicillin was discontinued; but the use of typhoid vaccine was continued and that of streptomycin was started locally. After two days of treatment with streptomycin, the pain was gone. After 14 days, the area no longer stained with fluorescein and the patient was symptom-free. The patient was examined in the clinic three weeks later. The eye was white; at the site of the previous ulceration there was scarring, which reduced vision from 6/21 to ability to count fingers; there was, however, no activity of the ulcer.

Case 7. W. W., a white man aged 34 years, was admitted on July 21, 1945. The patient had had recurrent corneal ulcers for the past year. Three weeks before admission, the left eye became painful and injected and failed to respond to the treatment previously prescribed. Vision of the left eye was 6/15 corrected to 6/9. The left eye had moderate conjunctival injection and edema of the lids. There was a large, deeply staining ulceration of the superior portion of the cornea, and many small irregular areas which also stained with fluorescein. Slitlamp examination showed the ulcer to extend into the stroma of the cornea, but the other ulcerations were superficial.

Treatment. The left eye was treated with a 1-percent solution of atropine sulfate, 2 drops, three times a day; hot compresses for 20 minutes, four times a day; 2 drops of streptomycin, every two hours day and night. The pain was gone after 36 hours of treatment. The ulcerations still stained. On the fifth day of treatment only the mid-portion of the corneal ulceration stained. It was thought that intravenous injections of typhoid vaccine would hasten recovery, and these were given every other day. Following 12 days of streptomycin treatment and four febrile crises, the ulcer no longer stained, and the patient was symptom-free. He was discharged; three months later, he had had no recurrence of symptoms, and at that time his corrected vision was 6/9.

Case 8. M. N., a white woman aged 60 years, was admitted on July 18, 1945. Two years before admission, the patient developed a right facial paralysis due to a parotid tumor. This was followed by frequent attacks of epiphora and inflammation of the right eye. Three months before admission, the right eye became red and painful, and there was a mucopurulent discharge. When this did not respond to treatment, the patient was admitted to the hospital. There was a lagophthalmos of the right eye. Vision was

1/60 corrected to 2/60. The conjunctiva was thickened and reddened with marked injection. The corneal ulcer involved the entire cornea and stained throughout. Because of the mucopurulent discharge, very careful cultures were taken, but Staphylococcus albus was the only bacteria cultured.

Treatment. Medication prescribed for the right eye was a 1-percent solution of atropine sulfate, 2 drops, three times a day; metaphen irrigations, four times a day, followed by liquid petrolatum; and intravenous typhoid vaccine. The ulcer failed to respond to this treatment, and a median tarsorrhaphy was performed, streptomycin drops being inserted at the medial canthus. Streptomycin was used as previously described. Due to a misunderstanding, the sutures were removed four days later, and this offered an opportunity to stain the ulcer. Only the temporal quarter of the previous ulcer stained. The pain was gone, and there was no longer any mucopurulent discharge. It was necessary to repeat the tarsorrhaphy three times because of failure of the lids to remain in approximation following removal of the sutures. During this entire period the patient received streptomycin drops through the medial canthus. It is interesting to note that the nasal portion of the ulcer healed first, the part proximal to the site of application of the streptomycin. Following 25 days of treatment the ulcer had completely healed, and the patient was discharged symptom-free. One month later the vision, with correction, was 6/15.

Case 9. B. W., a white woman aged 41 years, was admitted on October 9, 1945. For two years the patient had had recurrent inflammation of both eyes. Four weeks before her admission both eyes became acutely inflamed and sore. The right eye did not improve with treatment. Vision was limited to perception of hand movements. The lids of the right eye were red and severely inflamed; there was some mucopurulent discharge. A staining ulcer involved the entire lower half of the cornea. There was also scarring, with some leukomas present. Slitlamp examination of the right eye showed marked haziness of the cornea throughout most of its circumference and especially in its central half. There was infiltration of the deep layers of the cornea, especially of the posterior half, with one large, dense area of infiltration involving the entire thickness of the cornea just below its crest.

Treatment. The right eye was treated with a 1-percent solution of atropine sulfate, 2 drops, three times a day; hot compresses for 20 minutes, four times a day; and 2 drops of streptomycin, every two hours day and night. On the second day the pain had gone. There was only slight staining. Slitlamp examination revealed healing at the margins of the ulcer with curling of the edges inward toward the cornea. Five days later, no ulceration was seen with the slitlamp, and no staining. The patient was discharged symptom-free eight days after the start of treatment with streptomycin. Vision on discharge was 1/60.

Discussion

Although cultures were made from the ulcer margins, no bacteria grew, but cultures made from the inferior cul-de-sac showed Staphylococcus albus and occasional Streptococcus hemolyticus. The control group of 13 patients with corneal ulcer was hospitalized for an average of 20 days in comparison with an average of 15 days' hospitalization for nine patients treated with streptomycin. There were no patients in the control group whose condition was comparable to that in case 4 (corneal ulcer complicating exophthalmos), or in case 8 (neuroparalytic kera-

titis complicated by corneal ulcer). If these two cases are not considered in totaling the required days of treatment, the treated group was under medication 12 days and the control group, 20 days. The average duration of pain in the control group was four or five days, whereas in those treated with streptomycin, the pain was usually gone by the second day.

TABLE 1

DURATION IN DAYS AFTER BEGINNING MEDICATION WITH STREPTOMYCIN

Patient	Pain	Ulcer	Hospitalization
P. D.	3	4	6
W. W.	2	12	13
T. J.	2	5	9
J. G.	2	?*	19
P. G.	3	11	13
I. S.	2	14	28
J. D.	2	4	7
M. N.	4	?*	37
B. W.	2	5	8

* As these patients had tarsorrhaphies, it was impossible to determine the day the ulcers were healed.

We were unable to determine any difference in the vision of patients whose ulcers were treated with streptomycin and of those used as controls.

It is our belief (table 1) that in the small series studied, the duration of pain was shortened, the healing of the ulcer was accelerated, and the total time of hospitalization was shortened.

Conclusion

Streptomycin, a nontoxic antibiotic substance derived from Actinomyces griseus, was found to be a useful adjuvant to the treatment of corneal ulcers with atropine sulfate, hot compresses, and typhoid vaccine.

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LEGAL OPHTHALMOLOGY*

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Every action brought into court by one person against another is based upon a duty which that one owes to the other, and failure to perform that duty. If it is a contract, the suit is on a breach of the contract. If it is a tort, it is a breach of a legal duty which the law imposes. To illustrate, when two men are driving automobiles, each owes the other a duty to exercise ordinary care. If one violates that duty to his neighbor, he has an action against the one who causes the injury. Likewise, every duty in the medical profession is based upon the same relationship. Every operation which a physician or surgeon performs is performed under a duty created by law. The law thus creates a duty on the part of every physician. The law says, in general, that it is the duty of every physician or surgeon to bring to the treatment of every case that degree of knowledge, skill, and care which a physician or surgeon in good practice would ordinarily bring to such a case in that community. That, of course, is a somewhat broad definition. In all cases, these words—knowledge, skill, and care—are used to define the duty.

A physician is not an insurer that he will make a cure. That is not part of the bargain. He is not even sure that he will improve the individual's condition. His duty is to bring to the case that degree of knowledge, skill, and care which physicians in good practice would bring. The difficulty arises in the matter of proof of knowledge or skill or care, or the lack of it; and proof of fulfillment of that duty, of course, is made before a jury. Under the constitution of our country, every person, if he chooses, has a right to trial by jury. The jury, under the laws, decides the facts. When we have a jury trial, the duties which are upon the Court are divided into two fields; the judge, decides the law, and the jury decides the facts. The jury is supposed to decide the facts, within the letter of the law, as the judge lays it down. The judge has no choice. The law is there before the case is tried, and he interprets it as he believes it to be.

In the last analysis, however, the jury decides the facts, including the question of whether or not the physician or surgeon has brought to the case that degree of knowledge, skill, and care which he should bring. It is quite obvious that most of the juries—probably all—know so little about the subject of a controversy between a patient and a physician as to be completely lost in the technicalities of the subject. Some questions are simple and some definitely not so simple. At any rate, we start out by proof first that a physician is licensed, which he has to be to give any treatment to any patient whether he charges for it or not. It is immaterial whether he makes a charge or not; his duty to his patient is exactly the same. Then he gives proof of his knowledge by showing the college where he spent so many years; that he interned at such a hospital, or practiced under someone recognized as a famous physician or surgeon; that since then he has had some special training; the nature and length of practice in a particular field; whether he is the author of any treatises or books on any subject. Proof of skill is made by proof of such facts

Proof of a physician's care, which is usually the cause of the controversy, is

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made by proof of details of the particular operation or treatment that is the subject of controversy. Proof of lack of knowledge or lack of skill is not made by showing undesirable results, because the fact that there was an undesirable result, in itself, is no proof whatever that the treatment was not proper, nor that the result came from inadequate knowledge or failure to use proper care. Logically, the result, alone, proves nothing. The fact that the doctor made an improper diagnosis, which he may admit at the time of controversy was improper, or that, if he had to do it over he would do differently, does not mean lack of knowledge or skill or care. Proof of failure to furnish proper care is made only by proof of failure to do the things which a good physician, or a physician in good practice, would bring to such a case; and, therefore, the doctors hold the necessary proof in the palms of their hands. As a matter of fact, before there can be proof of failure in the duty of the doctor, there must first be proof by a qualified person who can say that proper treatment was thus and so, and that the doctor failed to follow such procedure, with a connecting link to show that his failure was the cause of the bad result that followed.

There are, of course, exceptions to that method of proof. The complainant's difficulty is that he cannot get one good doctor to testify against another—or against a bad one, so far as that is concerned—except in cases that are so flagrant that everyone realizes something has to be done. Part of this reluctance is due to timidity, part of it to fear that he may be in a similar situation some day, and part of it to a desire not to cause trouble to a fellow practitioner. As I said, there are exceptions to the rule of proof. You do not need the testimony of a physician or surgeon to prove that a doctor enucleated a good eye instead of a bad one, or extracted a tooth that was sound instead of an aching one, or that he burned the patient with some diathermy instrument, heat lamp or something of that sort, which if properly operated would not cause such a result. There are some cases which hold that where the doctor himself operates an X-ray machine, and a bad result follows, the bad result itself is evidence of bad management or carelessness, because ordinarily these things do not happen. The thing speaks for itself. This principle first arose in connection with common carriers. If you buy a ticket and the train jumps the track, that is all the proof a passenger needs. It is up to the railroad company to show why the train is off the track. So this doctrine is made to apply to certain treatments. Some of these cases may be defended on the ground that an individual is subject to some idiosyncracy, peculiar to him alone, such as a peculiarly sensitive skin, and the like. Not always will that be the case, because it may be the duty of the physician to find out, in advance, whether the patient suffers from some obvious idiosyncracy. The doctrine of "the thing speaks for itself" has at times been used in cases where a sponge is left in the abdomen at operation. The fact that a sponge is left in the abdomen after operation does not, under most decisions, however, of itself create a liability. Under the law of most states, it is the duty of the nurse to count sponges, and, I think, the instruments that are used; and it is held good practice for the surgeon to rely upon the count of the nurse for sponges and instruments. He can show that he had the nurse count the sponges when he was ready to close the incision, and that she told him the count was correct. Most sponge cases are defended in that manner.

Suppose a case where an injury has been caused as a result of negligence. For

example, an elevator falls and someone has an injury, and he sues the elevator operator for that injury; and suppose, thereafter, some physician or surgeon is guilty of malpractice in his handling of the injury. The injured can file suit against the operator of the elevator and recover damages, and if the patient has exercised ordinary care in the selection of a surgeon, the operator of the elevator is liable to the person injured for the entire amount of damage, including that which resulted from poor medical practice; the reason being that the ultimate result was proximately caused by the fall of the elevator. The injured may, at the same time, file suit for malpractice and may recover from the surgeon the damage caused by malpractice. However, this is a point you might have occasion to use some time. In the event a settlement is made with the operator of the elevator, and the operator of the elevator takes a release from the injured person, the injured is deemed in law to have had a satisfaction of his cause of action, and the release taken by the elevator operator automatically releases the physician or surgeon from the charge of malpractice.

In connection with this same subject is the subject of hospitals, generally. You will have to deal with this from time to time, and we might as well cover it. Under this head, hospitals are placed in three general classifications. First, the ordinary hospital operated for profit—such a hospital, its staff, nurses, and attendants, are liable for torts on the same basis as any individual. Second, a hospital that is a charitable institution, referred to as an eleemosynary institution, not operated for profit. Under the law, a charitable hospital is not liable for its negligence or torts. Suit cannot be maintained against it for negligent acts of its staff or nurses or attendants. Its staff and nurses and attendants would be liable as would any individuals. Under this head there have been some changes in the law.

Many of the old hospitals which had individual endowments had a very limited number of investments, but nowadays capital given to a charitable institution has to hunt around for a place to work. It is difficult to keep the money invested carefully, and at the same time make it earn anything. Chicago University is an eleemosynary institution, and it owns buildings around the city. If the neighborhood changes, all kinds of people become tenants in these buildings. Injuries occur and the University is sued. Some states divide the activities of charitable organizations into two categories. Some states excuse such an institution from liability for negligence so far as its activities are concerned with treatment of the individual. It is doing the very thing for which it was created. Yet, if such an institution is carrying on a separate business for the purpose of making money, such as renting buildings, even though the money is eventually spent for the purpose of charity, the institution is not excused from liability for negligence occurring in the course of carrying on the business, such as renting, wherein the institution earns the money.

There is a third class of hospitals, those which belong to the Government or State. One may not file a suit against the Government or State. It is true, we do have Courts of Claims, in which certain debts may be allowed, by the State, but in these Courts, a claimant does not prosecute his claim, as a right, but as a suppliant. There is no liability upon the State, nor upon any branch of the State, for negligence or torts committed in the course of governmental operations. The school board, for instance is not liable. One cannot sue the school board for whipping a child. The individuals working for these various governmental institutions are

liable in their own right personally. I remember a case wherein a patient had been sent to the X-ray room, and on the way back was simply rolled off the cart. He sustained a skull fracture and died. It was a charity hospital. The nurse had nothing, and that was the end of the case, because the hospital was not liable.

Nurses, like doctors, are duty bound to bring to the case they have in charge the same knowledge, skill, and care that nurses ordinarily bring to like cases. The only trouble is that many nurses step over their bounds. They become so accustomed to doing things that the try to do a few things extra, which doctors only should do, and get into trouble.

Hospital attendants are liable only for a failure to exercise ordinary care.

In connection with the field of expert testimony, all of you, sooner or later, will have some experience. As I said before, the facts of a case are determined by the jury. The jury has to decide first whether there is an injury, whether the fracture has healed in apposition, and so forth, or whether there was shortening, or other abnormal result. While the jury, in the last analysis, has to make a decision, the thing resolves itself frequently into a controversy between doctors. The doctor may not invade the province of the jury. The expert, the doctor, cannot tell a jury what caused the injury to happen, because the proximate cause or causal relationship between the accident and injury, or reasoning process which follows to a conclusion, is in the law a question of fact, which the jury must decide. So, we have the problem of getting the knowledge of the physician or surgeon to the jury in such form that it will enable the jury to know the facts without the doctor telling them what they have to do. We have a rule, therefore, that runs like this: Whenever, in any given field, proper conclusions can be arrived at only by a person who has special knowledge in that field, the law allows expert testimony. That may apply to the engineering field, the electrical field, medicine, or any highly specialized field. Since the physician or surgeon may not invade the province of the jury and tell the jury what they ought to decide, we have a process of allowing the expert, in whatever field he may be, to state an opinion based upon a hypothetical set of facts as to what might or could happen. That process works in this manner: First, all the ordinary circumstances which may be supplied by a layman or the patient himself are put into evidence in ordinary terms. Then a physician or surgeon is called on behalf of the one making the claim, and he states such facts as do not deal with the opinion. Then the reasoning process is followed through by allowing the lawyer to state his hypothesis. For example, he says: "Assume, doctor, that a person who was on such a date well and hearty, had no broken bones, suffers a fall in an elevator and, thereafter, it was discovered that he had a spiral fracture of the femur between the hip and the knee; and after certain treatment it was found that the bones which were fractured are in the position indicated by certain X-ray studies interpreted here before you; do you have an opinion as to whether or not there might or could be a causal relation between the blow and the fracture as indicated by the X-ray film?"

The doctor is allowed to say what might or could happen: "In my opinion, there might or could be a causal relationship." He does not say: "There is a relationship in my opinion." He cannot say that. The judge would strike it out immediately, because that is what the jury must decide.

Remember, the questions will follow that pattern: "Do you have an opinion as to whether there might or could be a causal connection." If the doctor has an

opinion, the answer is not that it did, but that it might or could. The jury will decided whether actually it did. You may answer: "It might and it could."

This sort of anomaly in the law is qualified to a great extent by allowing the doctor, when he has stated his opinion that a certain result might or could happen, to give his reasons therefor. The doctor should be asked: "Doctor, will you state your reasons for that opinion?"

If the doctor is honest, his opinion is probably correct. The doctor on the other side may likewise give his reasons, and the jury has some logical ground for choosing between the two. If you are called upon to testify as an expert under these circumstances and the lawyer forgets to ask you for your reasons, remind him that you would like to state your reasons, because your opinion backed by reasons is worth 10 opinions with no reasons.

A hypothetical question could wander all over wide territory, but there are certain rules which govern them. A hypothetical question must come within the facts or evidence. If the evidence is not in dispute, it must incorporate all the facts. If there is any objection to the hypothetical question, the objection must say where it differs from the facts. The opinion of one doctor, for instance, is not accepted as a part of a hypothetical question.

There is also a limit to the opinion. The doctor may not speculate as to a conclusion so far as any permanent or future disability or limitation is concerned. The doctor who expresses an opinion as to what may happen must respond with a "reasonable degree of certainty," and unless he can, it is called speculation. He cannot say that it is possible that the patient might have hemorrhages or apoplexy, because it is all outside the "reasonable degree of certainty" which the law requires. Evidence which is in the realm of speculation cannot be admitted.

An attending physician may testify in answer to a specific question, as to a patient's subjective symptoms. If he has not treated the patient, he is limited in testimony purely to objective symptoms. Hearsay testimony is generally not admissible. A statement by a patient to his attending physician, however, is an exception to the rule and will be received as evidence. Anything the patient tells his physician concerning his physical condition is not hearsay. In many cases, controversy has arisen over what is and what is not a subjective symptom.

In connection with testimony by experts, the question of cross-examination comes in for a great deal of dispute. The lawyer may attempt to cross-examine on medical questions, sometimes with success and sometimes not. Ordinarily, cross-examination is limited to the subject matter of the questions asked on direct examination. Additional questions, however, may be asked, when directed to testing the doctor's memory or his qualifications in respect to the medical field in question. Under this head, a skillful lawyer can give a doctor a rather thorough examination.

Sometimes the question arises as to whether chiropractors can act as expert witnesses. They can if they show they have special training.

You may be interested in what is necessary to prove a doctor's bill. All the doctor has to do is to say that he knows what a fair charge is, and that the amount is a fair, reasonable, and customary charge for such services in the community in which he is practicing. This varies with communities, as you know.

I have had a good deal to do with expert witnesses in the medical field. You can take this advice or leave it. Doctors seem to have a feeling that their patient is theirs. They develop, in the course of treatment of a patient, a certain loyalty and love that it is almost impossible to

overcome. It is a good thing for the community that this is so, because the community gets the benefit of that love and care. Usually the doctor who does not have some of that feeling is not worth his salt as a doctor. From the standpoint of the Court and the lawyer, however, this causes trouble. When there is a controversy between a patient and another person, the doctor seems to feel that it is his moral duty to come to Court and fight that patient's battle. If the patient has a joint that is somewhat ankylosed, he is likely to say there will never be any improvement, when he knows it is not so. He feels morally justified; he is helping his patient maintain his side of the case. You may feel this is morally justified, but as a matter of fact it is the difference between right and wrong. If you come into Court and knowingly testify that a patient has more injury than he has or less than he has, you are just as guilty as if you blew a safe or stole the money out of a cash drawer. That may be hard to swallow, but it is your pill; I do not have to take it.

There is a long history connected with honesty. You may have read Breasted's "Dawn of Conscience." If you go back to prehistoric men, you will learn there was a time when man was not concerned with conscience at all. When he and his friend went into the forest, back to back, to fight wild animals or enemies, each defended the back of the other. That is how they lived, and loyalty to one another grew to be an ironclad law long before anybody thought about conscience. Consequently, loyalty to one's friends is still a trait in humanity so much stronger than honesty that people ordinarily honest, decent, and careful will tell a lie for their friends when they will not tell one for themselves. I can prove that to you. People of two different churches get into two automobiles to go home. They have a collision. The people in one car will defend that car's driver, and likewise the other people will defend the other driver. The same is true of people riding in a street car. If there is an accident, they will defend the street car. It is loyalty to the crowd you are with. I do not blame you for that kind of view. It is natural. But, those of us who are supposed to have more moral education than others, and a greater discerning power along these lines, when called as expert witnesses, should sit down and think carefully what are the facts.

The testimony should then follow the truth, regardless of consequences.

We are also confronted with this situation: Frequently, a doctor comes into Court and has forgotten all about a particular case. When he is called upon to testify, he should take the time to check over the hospital records and the history sheet and refresh his memory. It is a nuisance, but it is his duty to do so. He picks up his notes, and the attorney objects to his reading notes. This is a legitimate objection. He is the witness, not the notes. If he does not now know what is in these notes, and if he knew at the time he wrote them, that they were correct, and that they are in the same condition as when written, the notes themselves may become evidence. He may be allowed to refresh his recollection from these notes or from the X-rays or a drawing or anything of the sort, or from anything which will, in fact, refresh his recollection. Thereafter, he may testify from his own memory, provided the thing used to refresh his recollection actually did refresh it. If he is lost without his notes, he should ask permission to review them, then put them down and tell the facts, not from the notes, but from his memory, so refreshed. I am sure all of you who call for this protection will get it.

I shall be happy to answer any questions anyone may have if I am able to do so.

Discussion

Dr. Guibor: We have considerable difficulty in getting nurses these days to aid in particular, cataract patients; are we allowed according to law to have a lay person watch that patient?

Mr. Hinshaw: I think this is really a medical question rather than legal. It is the duty of a doctor to bring to his patient the care and knowledge which would ordinarily be brought to such a case by physicians in good practice. Emergencies are excusable. You may not be able to do what you would like, but your duty includes aftercare. If physicians in good practice do, as a rule, leave such cases in the care of a lay person, then in doing so you are in good practice. If they do not, you are not.

Dr. Soper: Why does the Court require the doctor to answer questions instead of allowing him to tell the facts in his own language?

Mr. Hinshaw: If the lawyer who represents the side for whom you are testifying knows his business, you will not be confronted with that situation. The way to dispose of the difficulty with reference to complicated questions, is for the lawyer to break these questions up into simpler segments, and take one at a time. He can put them together when he argues with the jury. The doctor wanders out of legal bounds when he starts to talk about the medical side, without knowing the bounds.

Dr. Hoffman: What about those questions which cannot be answered honestly "Yes" or "No"?

Mr. Hinshaw: Always the witness has a right to object to giving any opinion, if, in fact, he has no opinion. He can say "I cannot answer a question Yes or No." If it cannot be answered Yes or No, usually he can say—"On that point I do not have an opinion." . . . If you do not know what to do, you always have a right to turn to the Court and say "Do I have to answer it? May I answer it in my own way? Or may I give my reasons?" You will usually find that latitude will be allowed.

Dr. Mundt: I should like to know Mr. Hinshaw's opinion of the possibility and probability of putting over the Minnesota Plan. If we all stood there and saw an accident, there would be considerable divergence of opinion as to what we saw. It is difficult for a man who has had a patient under observation not to have arrived at a conclusion that he should do something for the patient. But, I think, at times, the lawyer falls down on calling a man as an expert witness without having had a discussion as to what was to be brought out. Men are frequently put on the witness stand without any idea as to what is being shown. In the industrial boards very frequently the file of the case is sent to you.

Mr. Hinshaw: This Minnesota plan is the plan by which there is coöperation between the Bar Association and the Medical Society, for the purpose of eliminating, on both sides, testimony which is not true. The Medical Society has a committee appointed for the purpose of judging testimony which is claimed to be out of bounds. Whenever a lawyer believes such testimony has been given, he has a record made and submits it to the Medical Society. If the Committee of the Medical Society is of the opinion that the testimony does transcend the bounds of propriety or honesty, the doctor is called in for consultation and advised. If this is repeated, he may immediately be expelled. The same is true with the Bar Association; its members may be disbarred for similar actions.

GENERAL ANESTHESIA IN OPHTHALMIC SURGERY*

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Except in the case of children, local anesthesia may be used for practically all ophthalmic surgery. Having made this reservation, I shall proceed to discuss this specialized subject, "General anesthesia in ophthalmic surgery" under the following four headings in order to present the salient points without too much overlapping and to integrate the whole subject matter. (1) Patients suitable for general anesthesia. (2) Operations suitable for general anesthesia. (3) Premedication. (4) Anesthetic agents.

Patients suitable for general anesthesia. That children are best operated upon when they are under general anesthesia is a fact commonly accepted by ophthalmic surgeons. A second type of patient for whom general anesthesia is indicated is one so apprehensive, so emotionally unbalanced, that although a local anesthetic would be adequate, the psychic trauma is sufficient to warrant general anesthesia. This type is encountered in general surgery and also requires general anesthesia when operated upon for cysts, varicose veins, and the like.

Operations suitable for general anesthesia. Although it is true that local anesthesia can be employed for practically all operations, nevertheless general anesthesia is indicated in a number of instances. This is so in cases requiring extensive plastic surgery, for the local anesthesia might wear off before the operation has been completed. Acute glaucoma could also be included in this category, not only because the pathologic change involved makes local anesthesia less effective but also because the brevity of the operation favors the use of general anesthesia. Because of psychic factors, it would be well to include enucleations also.

Premedication. Since premedication determines the course of an anesthesia, a better understanding of this subject is essential. One may approach it by asking: what does premedication try to accomplish? First, it seeks to allay apprehension. Second, it is used to lower the threshold for pain so that a smaller quantity of the anesthetic will be required. Third, drugs are used for prophylactic measures. For example, atropine or scopolamine is used to counteract the action of pentothal. Fourth, it is necessary to dry up the secretions which obstruct breathing and cause postoperative nausea and vomiting.

The drugs that are used for premedication are the hypnotics (barbiturates); the opiates (morphine, dilaudid, pantopan, codeine, demerol); and the belladonna derivatives (atropine, scopolamine). A long-lasting barbiturate such as phenobarbital may be administered on the night before the operation; a combination of morphine and scopolamine (in the ratio of 1 to 25) one hour before the operation. This point about the use of an opiate should be remembered: Its action lasts from 3 to 4 hours, so that if the operation takes one-half to 1½ hours to perform, as it usually does, the analgesic properties take effect and lessen subsequent restlessness due to pain. However, if barbiturates are given preoperatively, the postoperative restlessness will be increased, unless

*From the Department of Anesthesiology, Mt. Sinai Hospital. Read before the New York Society for Clinical Ophthalmology, November 5, 1945.

an opiate is added, for the barbiturates are not analgesics. To draw a parallelism, when a barbiturate has been administered to an obstetric patient, restlessness will follow even though there is no awareness of pain because of the action of the hypnotics.

Both avertin and pentothal are used as basal anesthetics. I prefer pentothal for children and avertin for adults. The pentothal dose is computed on the basis of 1 mg. for each 50 lbs. of body weight. The total amount is dissolved in 30 c.c. of tap water at body temperature. It is administered rectally with a tube, slowly, while the patient lies on his left side.

Anesthetic agents. Ether is the best anesthetic agent for children. It has the widest margin of safety, and the various planes of anesthesia can be closely watched. Induction may be performed by means of ether, ethyl chloride, vinethene, or nitrous oxide. For maintenance of anesthesia, ether can be given by nasal catheter, by the use of an endotracheal tube (either through the mouth or the nose), or by means of an airway fitted with an adapter to which the tube is attached. When an endotracheal tube is employed, the anesthetist is completely out of the operative field, an adequate supply or oxygen is assured, and the anesthetist can easily control the patient.

Another widely used anesthetic is pentothal sodium. The virtues of this agent have been universally acclaimed. Much has been written of its wonderful properties—easy administration, smooth induction, minimal postoperative nausea or vomiting, and rapid recovery. Although pentothal is an effective agent, it is not the drug but the anesthetist who is responsible for good results. Proper administration is, after all, the factor that determines whether the patient has a smooth induction, an even course during surgery, and minimal postoperative effects.

Pentothal has become an excellent addition to the armamentarium of the anesthetist. It was first used clinically in 1934 by Lundy at the Mayo Clinic. Since then, its composition has not been changed, but its administration has been modified to a considerable extent. At first, a 10-percent solution was advocated. Now a 2½-percent solution is usually administered. The question as to speed and quantity of administration has also been answered. When the drug was first used, a certain amount was given for a certain number of minutes, but the dosage was never to exceed a gram. Today, however, pentothal or any other agent is given according to the needs of the patient, not according to a formula on a bottle.

A brief review of the physical properties of pentothal shows that it is broken down rapidly in the body, presumably in the liver, but how or why is not known. We do know how other barbiturates are detoxified, but not the modus operandi in the case of pentothal. There is a rapid induction, but no one can determine the course of the anesthesia.

Some of the complications that can occur include: hiccup, jactitation, excessive secretion, depression of respiration, nausea, and vomiting.

The following routine is employed when pentothal is the anesthetic agent: An adequate dose of morphine and scopolamine (in the ratio of 1 to 25) is given one hour before the operation. After the patient has been brought to the operating room, placed on the table, and draped, anesthesia is started. It is recommended that a local anesthetic be used, whenever possible, after the patient is asleep and before surgery begins. By decreasing the amount of pentothal that is required, the risk is minimized.

In conclusion, the following general statements may be made: The anesthesiologist has two responsibilities—to the patient and to the surgeon. While he is selecting the best anesthetic agent and the procedure best suited to the patient, he must always bear in mind that the anesthetic risk can be equal to, or less, than the surgical risk; but it can never be greater. The anesthetist makes the surgeon as comfortable as possible, gives him a clear field in which to work, and enables him to devote his entire attention to the operation.

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KERATOCONJUNCTIVITIS SICCA*

A SEQUELA TO PURULENT ERYTHEMA EXUDATIVUM MULTIFORME (STEVENS-JOHNSON'S DISEASE)

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Severe erythema exudativum multiforme is a disease of acute onset with fever, conjunctivitis, stomatitis, and cutaneous lesions. Its general course, although seldom fatal, is protracted, and its ocular sequelae often result in partial or total loss of vision. The etiology is obscure and pathologic findings are noncontributory.

Duke-Elder[1] lists only four cases of the purulent conjunctival form of erythema exudativum multiforme. Two of these cases were reported in 1922 by Stevens and Johnson[2] for whom this syndrome of the disease has been named.[3,4] The other two cases referred to by Duke-Elder are those of Wheeler[5] and Bailey.[6] Further mention of this disease in the literature includes the cases of Rutherford,[7] Ginandes,[8] Givener and Ageloff,[9] Rosenberg,[10] Lever,[11] and Murphy.[12]

Throughout the literature on Stevens-Johnson's disease which we have consulted, there was not mention of the relation of lacrimation to the corneal condition. Conversely, Bruce,[13] in describing keratoconjunctivitis sicca, finds no associated skin lesions analogous to erythema exudativum multiforme. It seems, therefore, of interest to present the ocular complications of the later stages of this disease in association with deficient lacrimation and a resulting keratoconjunctivitis sicca.

CASE REPORT

T. D., an Irish-born woman aged 28 years, was admitted to the Willard Parker Hospital on April 28, 1944. The patient had been under treatment for nervous symptoms during the previous six to eight weeks, using tincture of belladonna, phenobarbital, and progynon-B. Prodromal symptoms typical of measles progressed to a state in which diffusely confluent, erythematous, maculopapular eruption enveloped the face, the neck, the trunk, and the extremities, in association with scattered, large, confluent, thin-

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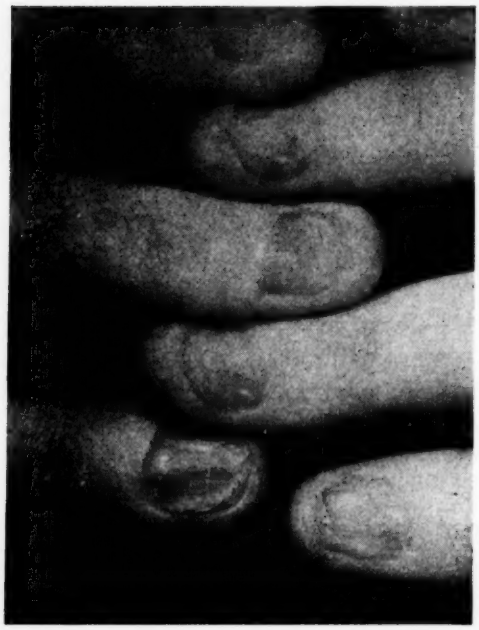

Fig. 1 (Richards and Romaine). Poorly regrown fingernails, shown six months after the acute phase of the illness.

walled bullae filled with clear fluid. Bullae appeared also on the mucous membranes. The past history revealed that the patient had suffered from a migratory polyarthritis and had had an ovarian cyst removed.

On admission, the temperature was 103°F., and the patient was dehydrated and prostrated.

Desquamation followed the acute condition, involving skin and mucous membranes, resulting in edema, necrosis, and mucopurulent discharge. Even the fingernails were lost (figs. 1 and 2). Bloody urine with casts, tracheal obstruction, and conjunctival adhesions occurred. The general treatment included saline infusion, plasma and whole-blood transfusions, vitamins, and the administration of penicillin.

Fig. 2 (Richards and Romaine). Both index fingernails are shown in a close-up view.

Ocular examination. The eyes showed destruction of the corneal epithelium and adhesions between the necrotic palpebral and bulbar conjunctiva. Treatment consisted of dilatation of the pupils with atropine, irrigations of the conjunctival sac with saline solution, and instillation of cod-liver oil. To combat the adhesions, contact lenses without the corneal segments (fig. 3) were employed, as suggested by one of us (H. R.).

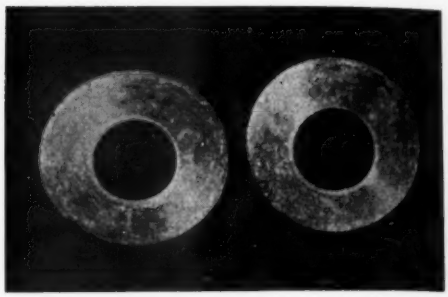

Fig. 3 (Richards and Romaine). Contact lenses are shown without corneal segments.

The general condition of the patient having improved, she was transferred to a ward of the New York Eye and Ear Infirmary on June 12, 1944, for a continuation of the ocular treatment. At this time, there was pronounced photophobia. The corneas stained faintly with fluorescein. In the cornea of the right eye a macula was observed lying inferiorly; in that of the left eye there was a central infiltration. After a week, the patient was discharged for treatment in the clinic, consisting of instillations of atropine and intermittent patching of the eyes. Prog-

ress was poor, and the opacification of the corneas increased, accompanied by superficial and deep vascularization, more in the right eye than in the left. By the end of three or four weeks, a number of superficial ulcers that had developed became covered with epithelium. The corneas showed a finely stippled staining with fluorescein, visible only with the slit-lamp. Vision was reduced to 5/200 in the right eye and 20/200 in the left.

On August 4, 1944, a peritomy on the right eye was performed with an electrocautery, resulting in an immediate decrease in the vascularization and opacification, and an improvement in the vision to 20/200. The vascularization returned soon, and since the infiltration increased simultaneously, X-ray treatment was undertaken by Dr. Thomas Graham, using 75 r each week to each cornea up to a total of 900 r.[14] After five doses, vascularization and infiltration were apparently reduced, but vision had decreased to 1/200 in the right eye and 5/200 in the left. Each cornea showed a finely stippled staining with fluorescein.

The patient was readmitted to the hospital on September 18, 1944, for treatment with irrigations of a solution containing 100 units of penicillin per c. c. of normal saline. This was done hourly, except during sleeping hours. The cornea of the right eye cleared considerably, that of the left slightly, and the photophobia decreased. Vision was 20/200 in the right eye and 20/70 in the left eye. After discharge, the patient's condition fluctuated between improvement and regression, with a gradual change from inflammation to healing with cicatrization. This paralleled changes in mucous membranes elsewhere in the body. Along with this change, typical signs of keratoconjunctivitis sicca appeared. The corneal epithelium maintained its stippled staining and dull-luster appearance. The Schirmer test[15] showed little or no lacrimal secretion. Routine laboratory tests were uninformative.

Local and general measures were employed in an attempt to relieve the photophobia and pain, and to prevent further ulceration, inflammation, and infiltration of the corneas, as well as desquamation of the conjunctiva from the lack of tears. The local measures employed were bland lubricants, holocaine and butyn ointments, atropine solution, dark glasses, and X-ray treatments to decrease neovascularization and to reduce infiltration. Frequent irrigations of the eyes with penicillin in saline solution were made. The general measures employed were vitamin therapy, including vitamins A, B_1, and B_2 in large oral doses for six months; pilocarpine with ammonium chloride for four weeks to stimulate secreta, progynon-B three times weekly for 10 weeks, and thyroid extract for four weeks.

The onset of manifest cicatrization was gradual, overlapping with the signs of inflammation, but exudation had definitely disappeared by the time that cicatrization signs had become apparent. Posterior symblephara, one infero-nasally in the right eye, and one supero-nasally in the left eye, occurred associated with a moderate obliteration of the fornices (figs. 4 and 5).

On November 15, 1945, a year and a half after the onset of the illness, vision was light perception in the right eye and 20/200 in the left eye. The Schirmer test showed a greatly reduced lacrimation. In the left eye superficial vascularization had increased, and the corneal epithelium still showed a finely stippled fluorescein staining, with no filaments. In the right eye, however, the cornea had undergone recurrent episodes of ulceration, until on November 10, 1945, an ulcer perforated with incarceration of the iris. On November 17, 1945, the right

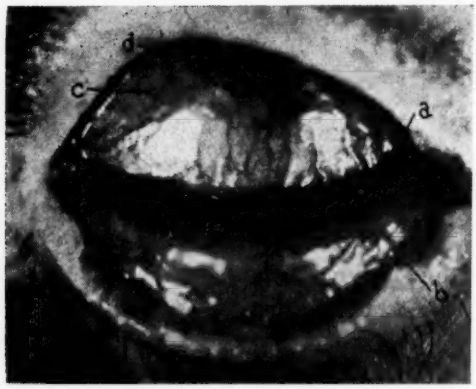

Fig. 4 (Richards and Romaine). This right-eye photograph was taken six months following the onset of the illness, and shows: a, the area of early infero-nasal posterior symblepharon formation; b, the desquamated mucocutaneous junction of the lower lid; c, the injected conjunctival vessels; and d, the hazy limbus corneae inferiorly.

Fig. 5 (Richards and Romaine). The left eye shows a posterior symblepharon supero-nasally.

eye was enucleated at the New York Hospital (figs. 6 and 7).

Microscopic examination of sections of this enucleated globe, including the area of perforation, revealed a nonspecific, chronic, superficial inflammation of the cornea.

Comment

The findings in this case are consistent with those in Stevens-Johnson's disease, which is the purulent conjunctival form of erythema exudativum multiforme. According to Rosenberg,[16] "differentiation of this disease at various of its phases must be made from septicemia, agranulocytosis, pemphigus, hemorrhagic measles, small-pox, Vincent's angina, and syphilis." This same author feels that "the differentiation is either apparent or readily determined or becomes manifest as the illness progresses."

The differentiation of severe erythema exudativum multiforme from acute pemphigus is difficult. Most patients with acute pemphigus do not survive. In those that do survive, the disease pursues a chronic course, and the final picture is similar to that of Stevens-Johnson's disease. In the acute stage, a Pels-Macht test[17] may be used to differentiate this disease from pemphigus. In our case, it was not done. Cicatrization of the sub-

Fig. 6 (Richards and Romaine). This post-operative view of both eyes shows the empty socket of the right eye.

Fig. 7 (Richards and Romaine). The left eye in a close-up view shows a paracentral nebula, superficial corneal vascularization, and a poorly demarcated mucocutaneous junction of the lower lid.

conjunctival tissue with the formation of symblepharon and with obstruction of lacrimation is a finding common to both diseases, leading to keratoconjunctivitis sicca.

The main clinical points of differentiation of the present case of erythema exudativum multiforme from pemphigus are:

History. Ovarian dysfunction. Suspected allergy to belladonna and barbiturates.

Rash. Bullae with a surrounding erythematous halo. Symmetrical predilection for the dorsal surfaces of the hands and feet. Absence of successive crops of bullae.

Eyes. Chronic progressive course of the keratoconjunctivitis with predominance of corneal over conjunctival lesions.

Summary

A case of the purulent conjunctival form of erythema exudativum multiforme (Stevens-Johnson's disease) is presented. The association of keratoconjunctivitis sicca with this disease is noted. Differentiation is made from pemphigus. Emphasis is placed on the dire ocular sequelae, with the loss of one eye and with reduction of vision in the fellow eye.

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A COMPARATIVE STUDY OF SUTURES EMPLOYED IN SURGERY OF THE EXTRAOCULAR MUSCLES*

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In an effort to evaluate the relative merits and disadvantages of the various sutures used in surgery of the extraocular muscles and to understand more fully the results obtained clinically, experiments have been performed on the muscles of rabbits' eyes and on other tissues.

In selecting sutures, size and weight rather than tensile strength have been used as criteria. When possible, sutures equipped with atraumatic needles have been utilized. In order to obtain results as comparable as possible, we have employed sutures manufactured by one dispensing house.† In evaluating results, we have studied the advantages, disadvantages, and the qualities of each suture, using several criteria.

The absorbable sutures used in these experiments were chromic catgut 3-0 (#1669), chromic catgut 5-0 (#1669D), and plain catgut 3-0 (#1667). The nonabsorbable sutures were black braided silk 6-0 (#P242), white braided silk 6-0 (#P290), black twisted silk 6-0 (#1661), black braided silk 8-0 (#P277), twisted white cotton 3-0 (#1641), twisted white cotton 4-0 (#1273, special), Nylon 6-0 (#P336), and kaldermic plastic 8-0.‡

TECHNICAL FACTORS

The qualities considered in evaluating the sutures were: (1) ease of handling, (2) adsorption and absorption, (3) tensile strength, and (4) friction coefficient.

Ease of handling. There is no question that the nonabsorbable sutures are easier to handle than the absorbable, with the exception of nylon, which is by far the most difficult in the transparent small-sized material we have used. When the absorbable sutures have been prepared by soaking before use, the difficulty is somewhat overcome; but as soon as the sutures dry, the difficulty once more prevails.

In the case of nylon sutures, the material cannot be well softened, even on prolonged soaking. Because of this factor the sutures are difficult to grasp during procedure and are inclined to twist on themselves and cause considerable annoyance in the tying of knots. If the sutures are colorless, the technical difficulties are further increased because the fine sutures are exceedingly difficult to see.

The advantage of the braided over the unbraided suture is that there is less likelihood of broken fragments of suture material being left in the tissues after removal. On the other hand, the braided sutures are hard to pull through muscle tissue, Tenon's capsule, and even conjunctiva.

Adsorption and Absorption. The factor of adsorption is more important in the absorbable sutures than in the nonabsorbable. The ability of the suture material to absorb fluid weakens the suture in proportion to the amount of fluid ab-

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† The authors are grateful to Davis & Geck, Inc., Brooklyn, New York, for supplying the sutures used in these experiments.

‡ Basic materials for manufacture are unobtainable at the present time as they are imported.

sorbed; therefore, the greater the absorption the weaker the suture becomes. The nylon suture, as stated above, has practically no adsorption and thus retains its original state, even in the presence of fluids.

The nonabsorbable sutures absorb a small amount of fluid, but this does not affect their strength over a short period of time.

The absorption factor or the ability of the tissues to break down, destroy, or digest the suture material is, of course, most pronounced in the absorbable sutures. The rate of absorption by the tissue may be controlled somewhat by treatment of the sutures during their manufacture. Similar conclusions were reached in the study of sutures used in corneal and scleral tissue.[1]

Whereas silk and cotton sutures are broken down following the process occurring at the site of the suture implant, the condition of the nylon sutures remains unchanged.

Tensile strength.[2] The third factor, tensile strength,* is one that may vary even in a small lot of sutures. The original tensile strength, provided it is at all adequate, is sufficient in any case to handle the stress placed upon it in muscle surgery and, therefore, the other factors involved are more important in the final outcome than is the original tensile strength of each suture.

Figures on the strength of the sutures used in our experiments were obtained by finding the tensile strength of a large number of sutures and recording the mean strength (table 1).

Friction coefficient. Nylon and chromic and plain catgut sutures have the disadvantages of possessing a poor coefficient of friction. The surfaces of all these sutures are smooth, do not readily produce friction against themselves when knotted, and, therefore, may prevent firm apposition of wound edges. Even when satisfactory surgical knots have been employed, it is not unusual to see slipping in this type of suture. In this characteristic the cotton and silk sutures have a definite advantage because a well-tied knot shows no tendency to slip and even a poorly tied knot has a better chance of producing satisfactory results. Furthermore, the resulting knot when tied with one of the first group is often two or three times as large as that tied with the latter group. A large knot causes mechanical irritation.

TABLE 1
TENSILE STRENGTH OF SUTURES

Suture Material	Size	Tensile Strength in Pounds	
		Minimum	Maximum
Chromic catgut (#1669)	3–0	3	4
Chromic catgut (#1669D)	5–0	1	2
Plain catgut (#1667)	3–0	$\frac{1}{2} \pm \frac{1}{4}$	$1\frac{1}{2} \pm \frac{1}{4}$
Black braided silk (#P242)	6–0	1	$1\frac{1}{2}$
White braided silk (#P290)	6–0	1	$1\frac{1}{2}$
Black twisted silk (#1661)	6–0	1	$1\frac{1}{2}$
Black braided silk (#P277)	8–0	$\frac{1}{2}$	$\frac{3}{4}$
Twisted white cotton (#1641)	3–0	2	3
Twisted white cotton (#1273, special)	4–0	1	$1\frac{1}{2}$
Nylon (#P336)	6–0	1	$1\frac{1}{4}$
Kaldermic plastic*	8–0	$\frac{3}{4}$	1

* See footnote page 1126.

EXPERIMENTAL PROCEDURE

Extraocular surgery employed in these experiments was limited to recession with scleral fixation (retroplacement) and re-

* The Scott single-strand tester was used to obtain a mean average of tensile strength in the sutures used.

TABLE 2

RESULTS OF EXPERIMENTAL STUDIES OF SUTURES

Type of Operation	Number of Rabbits' Eyes	Sutures Used	Number of Days *in Situ*	Macroscopic State*	Microscopic State	Miscellaneous Factors
Suture implant	10	Silk (8 braided 6–0; 2 twisted 6–0)	10 days	Mild reaction	Leukocytic infiltration; few fibroblastic cells	No slipping of knot noted
	10	Cotton (3–0 and 4–0)	10 days	Mild reaction	Leukocytic infiltration; few fibroblastic cells	No slipping of knot noted
	10	Nylon (6–0)	10 days	No reaction	Fibroblastic infiltration; very few leukocytes	Slipping of knot noted in two cases
	10	Plain catgut (3–0)	10 days	Marked reaction	Massive leukocytic infiltration. No evidence of fibroblastic invasion	Slipping of knot noted in one case. Surgical knot untied in one case
	10	Chromic catgut (3–0 and 5–0)	10 days	Severe reaction	Massive leukocytic infiltration with occasional areas of necrotic tissue. No bacteria seen	No evidence of slipping of knot
Recession with scleral fixation and resection	5	Silk (4 braided 6–0; 1 twisted 6–0)	20 days	No reaction	Fibroblastic wall around suture. Occasional lymphocyte	Sutures out in some cases†
	5	Cotton (3–0 and 4–0)	20 days	No reaction	Fibroblastic wall around suture. Occasional lymphocyte	In one animal respiratory infection resulted in intraocular infection
	5	Nylon (6–0)	20 days	No reaction	Fibrous wall	
	5	Plain catgut (3–0)	20 days	Mild reaction	Leukocytic and fibroblastic infiltration with destruction of almost all suture material	Slipping of knot noted in three cases
	5	Chromic catgut (3–0 and 5–0)	20 days	Moderate reaction	Leukocytic and fibroblastic infiltration rather marked. Suture material not all absorbed	Slipping of knot noted in two cases
	5	Silk (4 braided 6–0; 1 twisted 6–0)	40 days	No reaction	Fibrous tissue replacement of suture**	
	5	Cotton (3–0 and 4–0)	40 days	No reaction	Fibrous tissue replacement of suture	
	5	Nylon (6–0)	40 days	No reaction	Fibrous tissue replacement of suture	
	5	Plain catgut (3–0)	40 days	No reaction	Very faint area of fibrous tissue replacement	
	5	Chromic catgut (3–0 and 5–0)	40 days	Mild reaction	Fibroblastic infiltration with scattered lymphocytic infiltration	
	5	Silk (4 braided 6–0; 1 twisted 6–0)	60 days	No reaction	Fibrous tissue	No evidence of sutures noted‡
	5	Cotton (3–0 and 4–0)	60 days	No reaction	Fibrous tissue	No evidence of sutures noted
	5	Nylon (6–0)	60 days	No reaction	Fibrous tissue around suture	No evidence of sutures noted. Evidence of irritation of overlying conjunctiva from points of the suture material
	5	Plain catgut (3–0)	60 days	No reaction	Fibrous tissue	

TABLE 2—(*continued*)
RESULTS OF EXPERIMENTAL STUDIES OF SUTURES

Type of of Operation	Number of Rabbits' Eyes	Sutures Used	Number of Days *in Situ*	Macroscopic State*	Microscopic State	Miscellaneous Factors
	5	Chromic catgut (3–0 and 5–0)	60 days	No reaction	Active fibroblastic infiltration	
	1	Silk (twisted 6–0) †	30 days	Severe reaction	Necrosis. Strands of silk noted in fistulous tract. Bacteria seen	
	1	Chromic catgut (3–0 and 5–0)	20 days	Severe reaction	Large area involving muscles, conjunctiva and episcleral tissue, showing necrosis of tissue	No suture material found
	1	Plain catgut (3–0)	10 days	Severe reaction	Entire area necrotic	Infection involving entire periorbital tissue at time of enucleation
Implant into skin, striated muscle of leg, heart muscle, and peritoneum of rabbits		Nylon (6-0)		No irritation from sutures noted in specimens examined		

* Key to reactions: (1) Mild reaction—infiltration of small number of leukocytes and round cells, little or no edema, no marked changes in surrounding cells; (2) Moderate reaction—increased number of leukocytes and round cells, edema of the surrounding tissues with swelling and destruction of the surrounding tissue cells; (3) Marked reaction—an increase in the foregoing reaction with process reaching state of necrosis; (4) Severe reaction—large area of necrotic tissue to the extent of producing a slough.
† The sutures were either expelled by the tissue or removed in sectioning.
** Suture material absorbed or extruded and replaced by fibrous tissue.
‡ When microscopic sections were made, the suture material was apparently torn from the wound.

section operations. Sutures were also inserted into skin, striate muscle of leg, heart muscle, and peritoneum. In these experiments, cases in which infection developed postoperatively were not discarded, because we believed that it was of value to study the reactions of the sutures and the manifestations of infection. The eyes in the first group of cases were operated on by implanting the sutures without severing the muscle from its normal position, and the results were studied at the intervals shown in table 2.

Since there is a considerable variation in the size of the rectus muscles of the rabbit, the sutures were used alternately on different muscles. The superior and inferior recti were found more adaptable for experimental sutures. The oblique muscles, however, were used in many cases.

In all cases double-armed sutures were employed, and the clinical methods of recession with scleral fixation and resection were carried out. All sutures were tied with a primary double surgical knot followed by a square knot.

Microscopic and Macroscopic Study

The cases were followed and clinical evidence of reaction was observed over a varying period of time up to 60 days, and the eyes of several animals from each group were selected for macroscopic and microscopic study. The rabbit tissues studied microscopically* were examined

* The following method was used in preparing the microscopic sections: (1) Fix tissue in 10-percent formalin. (2) Place it in 50-percent alcohol for 24 hours. (3) Place it in 60-percent alcohol for 24 hours. (4) Place it in 70-percent alcohol for 24 hours. (5) Place it in 80-percent alcohol for 24 hours. (6) Place it in 95-percent alcohol for 24 hours. (7) Place it in absolute alcohol for 24 hours. (8) Place it in ether alcohol for 24 hours. (9) Place it in 1-percent celloidin (parlodion) for 6 to 8 days. (10) Place it in 8-percent celloidin (parlodion) for 6 to 8 days. (11) Place it in 15-percent celloidin (parlodion) for 6 to 8 days. (12) Place tissue in 15-percent celloidin in small jar or paper box under bell jar with

at the end of 10, 20, 40, and 60 days. A tremendous amount of work has been carried out in relation to the reaction and absorption of sutures in other tissues.[3-7] Therefore, the relation of these factors in eye surgery to surgery in other parts of the body was studied on a minor scale. Sutures of the same type used in the eyes were inserted in skin, striate muscle of leg, heart muscle, and peritoneum. The absorption of sutures and subsidence of reaction were more rapid in the eye than in other tissues of the body. The difference in rate, however, was so slight that it was believed to be of little significance. The method of interpreting the foreign-body reaction produced in the tissues was by estimating the size of surrounding infiltration, the presence of necrotic material in and around the sutured area, the invasion of fibroblasts in the late stage, and the variations in these findings at different stages.

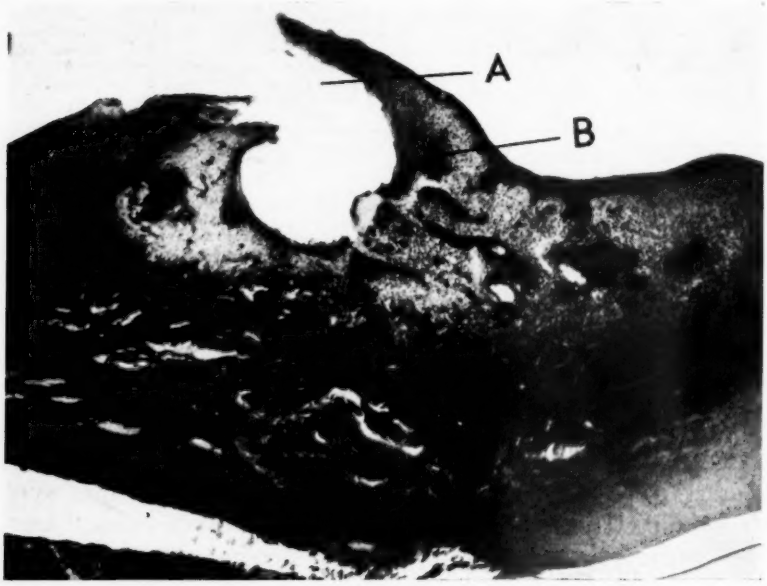

Fig. 1 (Berens and Romaine). Chromic - catgut - sutures area (10 days).* A, Area in cornea where chromic catgut was placed. B, Note marked vascular and round-cell reaction in the stroma of the cornea.

Results

The type of reaction, rate of absorption, and final state of the tissues in which the sutures were buried are shown in table 2. From this table it is evident that in every case, in the early stages, there was marked reaction in and around the absorbable sutures. In many cases the reaction surrounding the chromic catgut sutures was so great that it simulated conditions found in the presence of infection (fig. 1). The possibility that this was an allergic type of reaction was investigated by Pickrell,[8] and it was definitely believed to be a foreign-body reaction rather than an atopic manifestation.

The reaction surrounding plain catgut sutures was less marked but was definitely greater than that when nonabsorb-

chloroform for from 24 to 48 hours until it is hard. (13) Trim extra celloidin off around the tissue. (14) Mount on a block and place it in 80-percent alcohol. (15) Cut sections with the microtome (only the area where the sutures were placed). (16) Stain sections with hematoxylin and eosin and mount them on slides with Canada balsam.

* Corneal tissue is used to illustrate the reaction to the different sutures because the degree of reaction is demonstrated more clearly than in the muscle tissue.

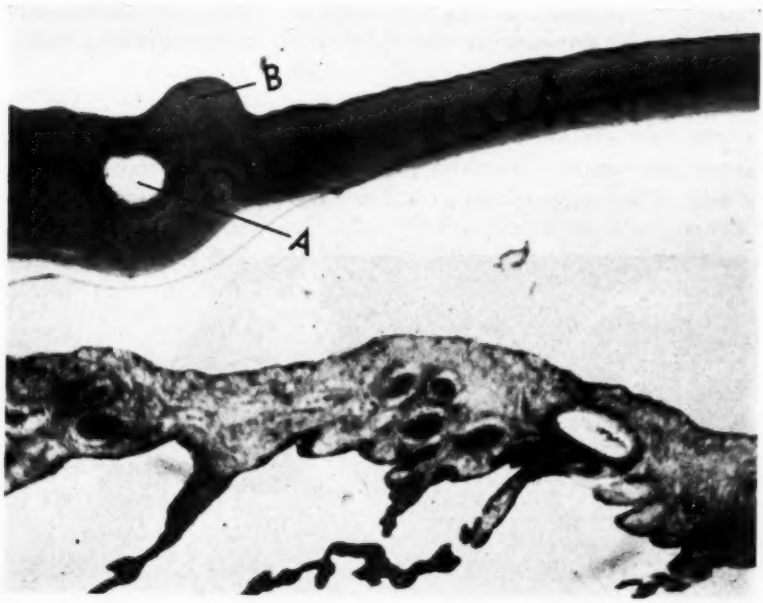

Fig. 2 (Berens and Romaine). Plain catgut-suture area (10 days). A, Area in stroma of cornea where plain-catgut suture was placed. B, Note mild reaction in the stroma.

able sutures were employed (fig. 2). This area of reaction was reduced at later stages, and there was practically no evidence of reaction at the end of 60 days in the chromic catgut sutures and at the end of 40 days in the plain catgut sutures. The suture material, itself, was usually absorbed within 30 and 20 days, respectively.

In the case of the nonabsorbable sutures, on the other hand, the immediate reaction was far less severe, the minimal amount being seen invariably in the nylon sutures (fig. 3). Little difference was

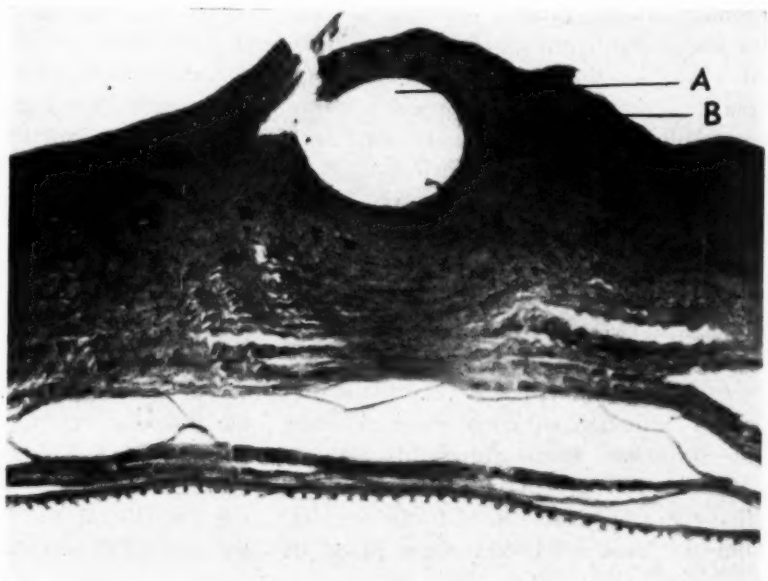

Fig. 3 (Berens and Romaine). Nylon-suture area in cornea (10 days). A, Where nylon-suture material was placed in stroma of the cornea. B, Note absence of reaction in the stroma and epithelium.

found in the reaction to cotton and to silk sutures, although in our opinion it was slightly greater in the case of silk than in that of cotton[9] (fig. 4). The studies at the later stages showed that the nonabsorbable sutures were surrounded by a wall of connective tissue. In the presence of infection, reaction was severe in all cases. This reaction was far more pronounced if the sutures were of chromic or plain catgut, and apparently less severe if of cotton than of silk. Although the plain catgut sutures are supposed to become absorbed in three days (more rapidly in the presence of infection), we found particles of suture material in the tissues after as long as 20 days.

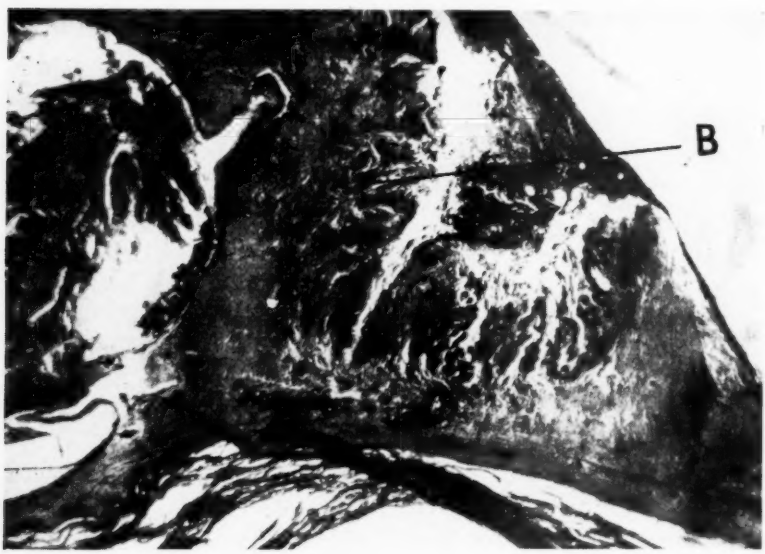

Fig. 4 (Berens and Romaine). Silk-suture area (10 days). A, Disintegrating silk fibers in area of implanted suture. B, Tissue reaction in the surrounding area.

Infection in rabbits' eyes is difficult to avoid. In drawing conclusions we have included no cases in which severe infection occurred. The relationship of the type of suture to infection is not revealed statistically, although we noted more evidence of infection when absorbable sutures were used. We do not believe, however, that this can be attributed to the sutures, but we have no bacteriologic proof of this fact, because the criteria were not cultured before their insertion.

Clinical use of sutures

Double-armed (6-0), colorless, nylon sutures have been used by one of us (C. B.) in 59 muscle operations (table 3). The reaction has been negligible in recession with scleral fixation (retroplacement) and resection of the medial, superior, and inferior recti; but when used in lateral-rectus surgery, the ends of the sutures, unless cut unusually short, tend to elevate the conjunctiva or project through it and maintain a mild reaction until the ends are cut shorter or removed. The sutures have been found especially useful in performing retroplacement of the inferior oblique, and 35 operations have now been performed with no apparent reaction and no infection. Fine curved needles are useful in this procedure, and, because of the proximity to the macula, reaction is to be avoided. Nylon has been found far superior to chromic catgut in transplanting Tenon's capsule,[10] where chromic catgut seemed to be responsible for a severe

tenonitis and a failure in one patient.

Analysis of the postoperative complications in 179 patients (117 private patients and 62 clinic patients [table 3]) revealed that severe reaction to nonabsorbable sutures is frequently the result of retained suture fragments. The criteria for recording the presence of infection were the results of cultures taken at the time of the complications. Infection occurred in only three operations on private patients. Of 62 clinic patients, infection occurred following 6 operations. We do not believe that the type of suture material is a major factor in the production of postoperative infection but, rather, that the major factor is contamination from some other source.

TABLE 3
COMPARATIVE STUDY OF POSTOPERATIVE COMPLICATIONS IN RELATION TO THE SUTURE MATERIAL IN 179 PATIENTS*

Suture Material	Irritation of Overlapping Conjunctiva	Infection (number)	Severe Reaction (number)	Cyst Formation (number)	No Complications (number)	Total
Silk (of some form)	0	3	4	2	34	43
Chromic catgut	0	2	12	1	14	29
Plain catgut	0	2	5	1	40	48
Nylon	2	2	3	2	50	59
Total	2	9	24	6	138	179

* Of the 179 patients, 117 were private patients and 62 were clinic patients. Of the 9 cases in which infection occurred only three were recorded in private patients.

Summary and Conclusions

This comparative study of sutures employed in surgery of the extraocular muscles includes a discussion of technical factors (ease of handling, adsorption and absorption, tensile strength, and friction coefficient).

Extraocular surgery employed in these experiments was limited to recession with scleral fixation (retroplacement) and resection operations. Sutures were also inserted into the skin, striate muscle of leg, heart muscle, and peritoneum.

The absorption of sutures and subsidence of reaction was more rapid in the eye than in other tissues of the body.

Since it was our purpose merely to point out the advantages and disadvantages of the sutures used clinically and experimentally, we have not designated one suture as better than another but merely indicated the results obtained.

1. Cotton and silk sutures are the sutures of choice when considered in the light of ease of handling, the braided sutures being preferable to the twisted type. Nylon (6-0) was found most difficult to handle.

2. From the standpoint of tissue reaction and tensile strength, the nylon suture (6-0) is the first choice and has been found most satisfactory clinically in surgery of the extraocular muscles. Fifty-nine operations have been performed. An annoying complication has been the irritation of the overlying conjunctiva by the stiff ends of the suture in operations on the lateral recti in two patients.

3. Of the absorbable sutures the advantage lies in the fact that sutures do not have to be removed, and the plain catgut produces far less reaction than does the chromic variety.

4. In the presence of infection, nylon,

cotton, and silk sutures are preferable to catgut, and chromic catgut is to be preferred to plain catgut. Experimentally, there was no marked relationship between the type of suture and infection. In those cases in which infection did develop, the greatest destruction of tissue was showed by the absorbable sutures.

5. Both clinically and experimentally, plain-catgut sutures (3-0) are sufficiently strong permanently to attach any extraocular muscle under ideal conditions.

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INFECTIONS AND REFLEX DISORDERS OF THE EYE FROM DENTAL AFFECTIONS*

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Since 1940, when I[1] wrote on a similar topic, a number of papers on this subject have appeared in the literature. One of the most critical of these, by Woods,[2] was on the larger aspect of focal infection in diseases of the eye. These papers have caused me to reëxamine critically the question of the relationship of ocular disorders to dental affections. A search of the literature on this subject reveals many contradictory statements.

BACTERIOLOGY

Rosenow[3] was the first to show the widespread prevalence of the streptococci, and demonstrated how by passage through animals and media, the virulence of the germs could be made to vary. In other experiments, he proved the selective activity of the various strains of streptococci; that is, germs from foci of infection in patients suffering from uveal disease caused similar eye infections when injected into laboratory animals.

Billings[4] became an early enthusiast for Rosenow's theories and he, more than anyone else, was responsible for popularizing and making these theories acceptable to the medical profession. According to him, a focus may remain dormant for years, because the natural defenses of the body prevent general infection; nevertheless, an insidious, slow, systemic intoxication may occur from this focal point of infection. At any time that the defenses of the body become diminished by overwork, dissipation, or exposure to cold or to trauma the latent focus may become activated. That a latent focus may remain dormant for many years I have shown in another paper.[5]

De Schweinitz[6] further broadened the idea when he defined a focal point of infection to be not merely an entrance for bacteria but also a place where conditions favor their acquiring the properties which give them a wide range of affinities for various structures.

Haden[7] made apical cultures from 1,500 incisors, cuspid, and bicuspid teeth. In cultures from 400 vital teeth, only 15 percent were positive; but cultures from 600 pulpless teeth with negative X-ray findings were positive in 55.7 percent, and from 500 pulpless teeth with positive X-ray findings, they were positive in 72.4 percent. Nonhemolytic streptococci were by far the most frequent organisms found.

Chojnocki[8] studied bacteriologically the devitalized teeth in 10 patients with iritis and in four patients with retrobulbar neuritis by injecting the infected material intravenously into rabbits. In most of the cases in which the eyes of the rabbits were involved, extraction of the teeth favorably affected the eyes of the patients. He concluded that negative X-ray findings did not rule out the possibility of apical infections.

Anastassoff[9] found that four of six cases of iridocyclitis were of dental origin. Injecting the material from the teeth into laboratory animals produced iridocyclitis and immature cataracts in these animals.

Siniscal,[10] after very careful and extensive experimental work, came to some very interesting conclusions. He found that injecting bacterial toxins from dental foci in man into albino rabbits produced

* Read before the New York Society for Clinical Ophthalmology, February 4, 1946.

no iritis; however, when he injected the bacterial organisms, iritis did develop in many cases. When he injected bacteria from the dental foci in patients who had concomitant iritis, iritis was more readily produced in the rabbits; but in rabbits which had had previous injections of bacterial toxins, the administration of bacteria produced iritis in a far greater percentage. It would, therefore, seem that the toxins diffusing into the blood stream over a period of months or years might sensitize the uveal tissue so that, later, bacterial emboli might more readily attack the tissue.

Many excellent observers have, however, come to exactly opposite conclusions.

Giani[11] injected many kinds of bacteria intravenously into experimental animals and found that the highest percentage of ocular involvement was produced by B. prodigiosus, and a very low incidence by the various strains of streptococci.

Cusumano[12] passed streptococci and staphylococci from eye to eye in a series of rabbits and later injected the germs intravenously. He found no elective affinity of the germs for the eyes.

Reiman and Hovens[13] not only denied that the teeth could act as reservoirs of infection for other parts of the body, but they were unable, by inoculation experiments, to substantiate Rosenow's theories of elective localization.

Guyton and Woods[14] after a recent survey, contrasted their conclusions with those from a survey made in 1941. They noted that the percentage ascribed to focal infection had decreased from 26.1 percent to 6 percent, and stated that this decrease paralleled their growing disbelief in the importance of focal infection as a cause of uveal disease. Brucellosis rose from a relatively unknown entity to 7.5 percent, while tuberculosis ranked very high, 49.7 percent in the first, and 41.0 percent in the present survey.

A significant statement, susceptible to varying interpretations, was that their consultants were unwilling to lay stress on trivial and minor foci of infection, with the result that the percentage of cases of undetermined origin rose from 1.8 in the first survey to 11.0 in the last.

Schmidt[15] also concluded from a study of 39 cases that chronic inflammation of the dental roots has no influence on the eyes.

Reports of clinical observations

The average practicing ophthalmologist has been far from skeptical in relating foci of infection, particularly in teeth, to eye disorders. Indeed, Woods, one of the severest critics of the focal-infection theory, stated that: "The mass of clinical evidence is so formidable that it is difficult to dismiss it lightly on the sole grounds that it is only suggestive evidence."

The popular connection between the eye and the teeth goes back to antiquity. Wilmer,[16] in an excellent historical review, reproduced a painting from the dawn of the Christian era showing St. Lucia, the patroness of sight, and St. Apollonia, the patroness of teeth, grouped together in one painting. This close connection has long been associated by the laity with the popularly known "eye tooth."

Cahn[17] records that over 200 years ago, Fabricius Hildanus reported the loss of an eye from a dental abscess, and Richter,[17a] in 1795, reported the case of a woman who was blind for several years, and then regained her sight after the extraction of a tooth.

Black[18] divided the ocular lesions from dental disorders into two groups: (1) inflammation of the various tissues of the eye; (2) reflex irritations which pre-

sented themselves as sensory, vasomotor, or muscular disorders.

Moczar[19] performed autopsies in 24 cases in which severe ocular complications had resulted from dental infections. He found that in the majority of cases there was a direct extension of the infection through the venous passages and, in 10 percent, the ocular infections were septicemic in origin. In other cases, ocular complications resulted from involvement of the contiguous bones or through the lymphatics.

Defong[20] reported two cases of orbital abscess in infants four and five months old, respectively, which were extensions from alveolar abscesses and osteomyelitis of the maxillary bones.

Wilmer[16] reported several cases of uveitis that were cured when the involved teeth were extracted. There were no recurrences in any of his cases in over 10 years of follow up.

Steinbugler,[21] in a survey of 53 cases followed for over a period of two years, found that infected teeth could cause practically any type of eye infection. There were 32 cases of uveitis, 4 of detached retina, 4 of episcleritis, 1 of retrobulbar neuritis, and other miscellaneous eye involvements.

Kieive and Reh[22] reported a case of a hole in the macula in a woman, 37 years of age. Some vision returned after removal of the infected teeth. Smith[23] reported the case of a man with greatly reduced vision which cleared seven weeks after removal of two infected upper bicuspids.

Lagrange and Marq[24] reported a case of intractable iritis which cleared only after the infected teeth were removed. They stressed the importance of the teeth as a source of infection.

Boros[25] reported the case of a woman, aged 42 years, with a hemorrhage on the disc and stellate white spots in the macula of the right eye. The greatly reduced vision returned to normal after the removal of 10 bad teeth. Kapuscinski (cited by Wilmer[16]) reported 51 cases of iridocyclitis which healed after extraction of the diseased teeth.

Prangen[26] emphasized the close relation between poor accommodation and dental disease, and Roper-Hall,[27] in his Middlemore Lecture of 1941, stated that oral sepsis far exceeded any other form of focal infection. He recommended that every ophthalmic hospital have a dental surgeon on its staff.

Krusin[28] reported the case of a man, aged 50 years, who had a severe corneal ulcer which did not clear up until an infected tooth was removed. He also described the case of a woman, aged 45 years, who had severe neuralgic pain and epiphora which did not clear up until a residual bone infection from an infected tooth was healed.

Green[29] reported the case of a man, aged 47 years, who had a retrobulbar neuritis, with extreme loss of vision in the right eye and marked loss of vision in the left eye. After several infected teeth were removed, there was a complete return of vision in the left eye but only 28-percent return of vision in the right eye.

Holman[30] summed up the literature on the question of focal infection, and accepted, with reservations, the relationship between primary foci of infection and remote disease. However, he felt that there was not sufficient evidence to confirm the theory of elective localization, but that the involvement of the eye might be in the nature of an allergic phenomenon, a sensitization of the eye to the bacterial toxins. Wooton[31] also was of this opinion.

It is, therefore, apparent that every form of ocular disorder has been ascribed as secondary to infections of the teeth. This question is also important when surgery of the eye is contemplated.

Postsurgical involvement

Ellett[32] stated that he had seen many eyes do badly after operation, but improve after removal of the teeth.

In this connection, one is apt to jump to conclusions too hastily, for who has not had the sad experience of postoperative infection even after eradication of all available foci? On the other hand, consider the small percentage of postoperative infections in the numerous cases in which either no search for infective foci or only a superficial one had been made. This is true not only in cases of emergency operations, on patients with acute glaucoma and on traumatized eyes, but also in the elective surgical cases, the patients with cataracts and chronic glaucoma. One must also remember that at times the removal of infected teeth is not an innocuous procedure.

Okell and Elliott[33] showed that 75 percent of blood cultures following removal of teeth were positive for Streptococcus viridans.

King and Lord[34] found that 12 percent of lung abscesses resulted from extraction of teeth; while Bender[35] reported a case of bilateral thrombosis of the central veins following the extraction of four teeth in a woman, 32 years of age.

Nerve palsy

W. Russell Brain[36] reported a case of 3d-nerve palsy on the right side, following the removal of a right upper lateral incisor. The palsy remained partially permanent.

Bailliart and Schiff-Wertheimer[37] reported the case of man with a left 3d-nerve paralysis and bilateral optic atrophy who recovered vision after relief from pressure due to a localized inflammatory mass in the region of the chiasm which resulted from an arachnoiditis following removal of a lower-left-molar tooth.

Is the exacerbation of an eye disease following the removal of an infected tooth a definite indication of an interrelationship? If they are related, is it a specific or a nonspecific-protein reaction?

I have always believed that these reactions were in the nature of an anaphylactic reaction with a great outpouring of exudate and edema. If the reaction is too severe, the function of the eye may be destroyed even though the disease process is stopped.

Woods[2] believes that this reaction is in the nature of a Shwartzman phenomenon: the lighting up of an inflammatory focus from a nonspecific reaction, or an allergic shock to specifically sensitized tissue.

Regardless of the mechanism, I think that such a reaction speaks for a close relationship between the infected teeth and the involved eye. Because of the danger of an overwhelming reaction in the eye, too many teeth should not be extracted at one sitting or at too close an interval, and operation on eyes should not be undertaken until healing in the region of the extraction is well advanced.

The next group of disorders are those which result from a reflex irritation of the 5th nerve. These may be due to an infective, or, more frequently, a noninfective chronic irritation in the mouth, often an unerupted wisdom tooth and may involve any part of the eye.

Krusin[28] quotes Henry as having found 50 cases of uveitis, out of 700, with dental disorders, and only slightly more than half of these were found to be of septic origin. Bleichsteiner[38] reported cases of herpes corneae due to reflex irritations of the 5th nerve, and Wilmer reported a case of unilateral complete loss of vision, cured after removal of an impacted wisdom tooth.

The most common symptom induced by these reflex irritations is a neuralgia, in-

volving either part or the whole of the 5th nerve. Rowland[39] claimed that the connection of the teeth and eye via the 5th nerve was a very important cause of neuralgias, either inflammatory or of reflex origin.

Resch[40] stated that the intimate relationship between septic teeth and general headaches and facial neuralgias has definitely been established. The atypical neuralgias in which the symptoms are less severe but more continuous were more definitely due to etiologic factors such as the teeth. He noted that pain sensation was peculiar to the pulp of the teeth while pressure sensation was registered entirely by the investing peridental membrane. He also felt that migraine headaches may be an allergic manifestation arising from the ptomaines or bacterial proteins from chronic tooth sepsis.

Black[18] maintained that the reflex neuroses were practically always due to irritation of the vital pulp of a tooth, although an occasional case may be due to an impacted tooth. The neuralgias were, therefore, usually due to a thermal or foreign-body irritation of the exposed pulp. He stated that the pulp may be infected yet retain its vitality for a long time, explaining the relationship as follows: The pulp is enclosed in the solid dentin and cannot expand. The blood vessels of the pulp have thin walls and expand when irritated, thus pressing upon the delicate 5th-nerve endings. Therefore, in cases of neuralgia, a tooth sensitive to heat, cold, or pressure should be sought and X-ray studies made for suspected impacted teeth.

Bauer,[41] likewise, believed that a neglected dental neuralgia may in time become a true neuralgia.

Gardner,[42] however, takes issue with these claims. He describes a true facial neuralgia (tic douloureux) as a lancinating, paroxysmal pain in the distribution of one or more branches of the trigeminal nerve. Most frequently it is intraorbital at the start and later spreads. It affects both sexes about equally and is bilateral in 20 percent of the cases. Because of the location of the pain and its resemblance to the pain caused by a drill on the pulp, the teeth very early are looked upon with suspicion, particularly because an attack is frequently incited by chewing or touching a tooth. In spite of these seeming connections, he claims that no dental condition, however neglected and aggravated, can cause tic douloureux. These sufferers usually have had several and even all teeth removed to no avail, but he holds that a tooth may act as a so-called trigger zone.

It seems to me that any irritation of the 5th nerve is a real neuralgia, whether it is from an unknown cause, the so-called tic douloureux, or from a cause which can be found and eradicated. The pain from the latter can be just as severe and disabling.

Report of cases

Case 1. C. I., a woman aged 33 years, came to the office on April 5, 1936, because of an itching of both eyes which had recurred for the past few summers. A diagnosis of vernal catarrh was made and appropriate medication was prescribed. On April 30, 1938, the patient returned because the right eye had been red and painful for one week.

Examination disclosed a patch of scleritis adjacent to the nasal side of the cornea. At this time, she also gave a history of recurrent pains in her joints.

The dental report was as follows: A lower premolar had definite bone abscess, and when removed, free pus was visible. In the upper jaw three nonvital teeth were removed, two of which had putrescent canals.

The scleral infection disappeared com-

pletely within two weeks and has not recurred since. When last seen, on March 15, 1941, fine vitreous opacities were the only remaining evidences of the previous infection.

CASE 2. A. P., a man aged 58 years, came to the Beth Moses Hospital, complaining of pain and redness in the right eye. In 1934, he had been treated by the medical department for rheumatism. He was referred for complete checkup for possible focal infection.

Examination revealed vision to be: O.U., 20/20. There was a scleritic nodule at the temporal side of the cornea of the left eye. This was tender to touch.

A dental checkup revealed many infected teeth. These were treated. The scleritis was cured and has not recurred since then.

CASE 3. A. McL., a woman aged 42 years, came to the office on February 5, 1939, complaining of a sandy feeling that had been present in both eyes for many weeks.

Examination showed vision to be: O.U., 20/200. There was a superficial punctate keratitis involving both eyes. Every tooth possessed by the patient had bad apical infection. Over a period of two months all her teeth were removed. The punctate keratitis began to improve almost immediately after only a few of the teeth had been removed. She has had no recurrence of the condition since then.

CASE 4. W. R. H., a man aged 55 years, came to the office on February 8, 1945. About a week earlier he had developed a pain on the left side of his forehead followed by pain and redness of the left eye. At the present time, the pain had disappeared but he now complained of poor vision in that eye.

Examination. Vision was O.D., 20/50, improved to 20/25; O.S., 20/200, not improvable. The cornea was hazy and showed many deposits on the posterior corneal surface. The iris was hazily seen. Atropine and hot compresses were prescribed. Two days later tension in that eye rose to 55 mm. Hg (Schiøtz), and the appearance of the eye was not changed. The following day the tension was 35 mm. Later that day a tooth was removed, followed by the removal of another tooth four days later. The eye began to improve rapidly, and in less than two weeks the eye was cured.

CASE 5. H. L., a woman aged 32 years, came to the office on May 16, 1945, because the left eye had been red and painful for five days. She stated that she had never had trouble with either eye before.

Examination. Vision was O.D., 20/20; O.S., 20/70. The left eye showed marked circumciliary injection. There was a dense opacity of the cornea in the pupillary area with deep vascularization. There were many "mutton-fat" deposits on the posterior cornea.

The patient was referred for a complete physical examination, including a tuberculin test and dental checkup. The general physical examination and tuberculin tests were negative, but X-ray films of the teeth revealed an abscess around the upper left premolar. It is interesting to note that the patient at no time complained of pain or tenderness in this area.

Following removal of the tooth, the eye became more red and painful, and the patient felt as if a foreign body was in her eye. Soon the latter began to improve rapidly, so that by July 5, 1945, the eye was white, the deep vascularization had regressed, and the deposits on the posterior cornea had completely disappeared. However, there was still present a fine opacity of the cornea in the pupillary area. Vision was 20/25.

CASE 6. C. I. R., a woman aged 39 years, came to the office in May, 1937, with a history that four nights previously she was awakened by a severe pain in the right eye. This pain, lasting a minute or two, had since recurred several times a day.

Examination. The right palpebral fissure was slightly wider than the left. Corneal sensation was equal in both eyes. Vision was normal, and no pathologic process was found. The next day, the pain was more severe and atropine (1 percent) was instilled although there was no real basis for so doing. In two days, the pains had disappeared completely, and both palpebral fissures had become equal.

On September 15, 1937, the patient returned because of extremely severe recurring pain in the right eye for the past two days. She stated that since her last visit she had had pain every day.

Examination. The cornea of the right eye presented a diffuse desquamation of the epithelium. Local therapy and a thorough but vain search for focal infection were instituted. However, an X-ray film of the mouth revealed an upper right impacted wisdom tooth, which was removed. The cornea cleared up in two weeks. The patient has since remained completely free of symptoms. Her last visit was on May 7, 1944, for a refraction.

CASE 7. F. R., a woman aged 53 years, was originally seen on December 26, 1936, when glasses were prescribed for compound myopic astigmatism.

On February 5, 1939, she returned because the left eye teared a great deal, was sensitive to light, and felt irritated constantly. Her symptoms began a day after an upper left premolar tooth had been extracted, a week before.

Excepting for an eye which was sensitive to light and which teared excessively, no pathologic change was found. Her symptoms did not disappear until about three weeks later; evidently not until complete healing had taken place in the tooth cavity.

CASE 8. E. S., a woman aged 18 years, came to the office on June 6, 1937, because the eyes felt strained and the right eye had been bloodshot, on and off, for the past year.

Examination was completely negative excepting that the cornea of the right eye and the right side of the face were more sensitive to the touch than the left.

On December 4, 1937, she returned because the pain in the right eye had become severe. The eye showed no pathologic lesion. X-ray examination of the jaw showed that a wisdom tooth was progressing and would probably erupt.

About a year later the tooth erupted, and the pain disappeared. Corneal sensitivity in both eyes became equal.

CASE 9. M. W., a man, aged 38 years, came to the office on August 2, 1943, with a history that for the past several months he had been awakened frequently during the early morning hours by an excruciating pain in the left side of the head. This pain was accompanied by blurring of vision in the left eye. A diagnosis of glaucoma had been made by an ophthalmologist, and he was under treatment with miotics, without amelioration of the symptoms.

Examination. There were no evidences of glaucoma, and no other ocular causes for the pain were found. The patient was referred for a dental checkup, and this was reported as negative.

The neuralgic pains became more frequent and more severe, so that when seen again on October 3, 1944, the patient was extremely despondent. He had lost a good deal of weight and was about to sell a

very successful business which he had spent many years in building up. He was intending to move to the South West in the hopes that a more favorable climate would help the tic douloureux which had been diagnosed.

The patient was again advised to have the teeth checked, but with negative results. In as much as the dentist scouted as absurd the possibility of a connection between the pain and the teeth, I felt that the examination was not conscientiously made. The patient was advised to have another dental opinion.

This examination showed some absorption around an upper left bicuspid, and when this tooth was removed, the infection was found to be much more marked than the X-ray film had indicated. The patient has not had a single attack of pain or blurring of vision since the infected tooth was removed.

CASE 10. S. S., a woman aged 39 years, came to the office on March 17, 1945. A few weeks before a foreign body had been removed from her left eye. It was not embedded. Since then there had been very severe pain in the eye and tearing. No pathologic change was found to account for the symptoms. Hot compresses to the eye were advised.

On March 27, 1945, the patient returned for a refraction and gave the information that about a week after her earlier visit to the office, she had gone to the dentist, who found a very badly infected upper rear molar on the left side. After removal of this tooth, the pain and the tearing disappeared as if by magic.

CASE 11. S. S., a woman aged 49 years, came to the office on April 30, 1938, because of headaches and recurrent severe lancinating pain on the right side of the face. These pains had been present ever since the removal of the canine tooth on that side.

Ocular examination was completely negative. X-ray films of the jaw proved that the root of the canine tooth had broken off during removal and was still present. The neuralgic pains and headaches disappeared completely upon removal of this root.

CASE 12. R. B., a woman aged 19 years, came to the office on May 3, 1939, because she had had recurrent attacks of pain on the left side of the face for the past month. These were sharp and lancinating in character. They began at the lower part of the face, shot up to the eye, and lasted for a few seconds at a time. Her father, who was a physician, had had her thoroughly examined, but no cause for these attacks were found.

Examination. Vision was O.U., 20/15. The eyes were completely negative for pathologic change. X-ray films of the teeth disclosed an erupting wisdom tooth in the upper left jaw. The dental surgeon advised no interference because it was coming through normally. In a few months the pains had completely disappeared and have not recurred since.

CASE 13. E. E., a man aged 32 years, came to the Brooklyn Eye and Ear Hospital on April 17, 1945, with a history that, a week before, a lower right premolar and an upper right rear molar were extracted because they were abscessed. Soon after the extraction, the right eye became blurred, and the following day he developed pain above that eye.

Examination. Vision was O.U., 20/20. There was a moderate circumciliary injection of the right eye. The anterior chamber was slightly hazy, and the iris markings were not well delineated. A mild iritis was diagnosed, and the pupil was

dilated. A few posterior synechiae were easily ruptured, and with the usual local therapy the eye was completely healed in a few days.

CASE 14. W. L., a youth aged 17 years, came to the Brooklyn Eye and Ear Hospital on November 15, 1937, at which time glasses for compound hyperopic astigmatism were prescribed. Vision with the glasses was 20/20. On March 18, 1939, he returned because annoying spots had appeared before the right eye for several weeks.

Examination. No change was found in his refraction or vision; there were numerous fine opacities in the vitreous. A complete check for focal infection revealed a cyst in the roof of the mouth. This was removed in the dental department.

He was last examined on June 22, 1939, at which time he stated that the spots were not annoying him any more. Examination showed that fine vitreous opacities were still present but that they were greatly reduced in number.

CASE 15. L. R., a woman aged 43 years, came to the Brooklyn Eye and Ear Hospital on March 25, 1939, because vision in the right eye had been reduced for three weeks.

Examination. Vision was O.D., 20/50; O.S., 20/20. There was a patch of exudative choroiditis in the lower periphery, and the vitreous had many large opacities. Examination at the dental department disclosed abscesses of the right lower bicuspid and the left lower molar. Both teeth were removed.

When last examined, on April 27, 1939, only some fine vitreous opacities remained in the right eye and vision was 20/20.

CASE 16. H. G., a man aged 36 years, came to the office on April 13, 1939, because he noticed that vision in the right eye had suddenly become blurred three days before.

Examination. Vision was O.D., perception of shadows; O.S., 20/15. There was a large patch of exudative choroiditis, temporally, and the vitreous was full of large opacities. There was also a detachment of the retina, above and temporally.

Examination of the mouth showed four upper teeth on the right side to be abscessed, and the jaw under one of the teeth was badly infected.

The teeth were removed, and the jaw scraped. The choroidal exudate cleared up. The opacities became fine and scanty, but the detachment increased in extent and was considered inoperable.

CASE 17. R. L., a woman, aged 40 years, came to the office on May 9, 1931, stating that vision had begun to fail in the right eye one week ago. On the day before, vision suddenly became much worse, and the eye was painful. That night she could not sleep because of pain on the right side of the forehead.

Examination. Vision was O.D. perception of hand movements; O.S. 20/15. There was marked circumciliary injection. The cornea was steamy, and the interior chamber shallow. The pupil was dilated and did not react to light. There were no spots on the posterior corneal surface. The fundus was not visible. Tension was 25 mm. Hg (Schiøtz), in the right and 12 mm. in the left eye.

A 0.5-percent solution of eserine was instilled in the right eye until the tension was reduced to 15 mm. and the pupil became contracted. The patient left the office completely free of pain, taking with her a prescription for 2-percent pilocarpine, which she was to instill every hour. On the way home she developed

very severe pain on the right side of the head but she did not return until two days later, at which time the pupil was very irregular and there were many deposits on the posterior corneal surface. Tension was 30 mm. (Schiøtz). A diagnosis of iridocyclitis with secondary glaucoma was made. The pupil dilated easily, and a large patch of chorioretinitis in the lower temporal periphery was noted. As the mouth appeared to be in very poor condition, a dental checkup was advised. Almost every tooth had apical infection, and the dentist removed six teeth at one sitting. Soon after, she experienced very severe pain in the right eye and, when seen the next day, the fundus was so full of exudate that no details could be made out. In a few days, the lens became opaque and swollen and the anterior chamber shallow, but there was no increase in tension.

When she was discharged from treatment on October 19, 1931, the eye was white, the lens opaque and glistening white. On December 31, 1936, she returned because of pain in the right eye and forehead, present for two days. The cornea was steamy, and the anterior chamber practically absent. Tension was 60 mm. Hg (Schiøtz). A peripheral iridectomy was performed at the Brooklyn Eye and Ear Hospital the same day. The eye has since remained white and free from pain. When last seen, on October 10, 1945, she had uncertain light projection.

Conclusion

In my opinion, the eyes are closely related to the teeth and, in a fairly large percentage of cases, are involved by dental infections. This relationship holds true not only for the frankly infected teeth but also for the devitalized teeth. Reflex irritations of the 5th nerve from dental conditions can cause severe facial neuralgias which may be indistinguishable from the true tic douloureux. It may also result in a pathologic picture simulating inflammatory conditions, particularly of the cornea.

Indiscriminate sacrificing of teeth should be avoided, and the opinion of a dental surgeon should be sought. Radical dental surgery, such as the removal of many teeth in too short a time, should be avoided because of the danger of an overwhelming reaction in the eye and the subsequent destruction of sight. The indiscriminate removal of teeth before an eye operation is not warranted. However, teeth showing definite apical infection should be removed. If there is a history of past infection of the eye from focal infection, the devitalized teeth should also be removed.

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CONJUNCTIVITIS ASSOCIATED WITH ERYTHEMA MULTIFORME BULLOSA

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The multitudinous terminology used in the designation of disease entities in dermatology has led to a somewhat confused state in regard to the ophthalmologic aspects of some of these diseases. As early as 1866, von Hebra[1] described a skin condition, called erythema exudativum multiforme, which is characterized by an eruption of the face, neck, and the extensor surfaces of the hands, forearms, and legs. Constitutional symptoms were rare or absent. Apparently, ocular signs were also absent or were too insignificant to mention. Yet the literature, though relatively meager, has persisted in the use of this term, with its association to definite inflammatory signs of the conjunctiva. It is apparent that so broad a disease entity as erythema multiforme would be described in a variety of forms, some as affecting one part of the body and others designated as having an affinity for particular organs. Thus, dermatologists have noted that one of the rare forms of this disease not only presents the typical exanthem, but also shows vesicular lesions affecting the mucous membrane of the mouth and of the eyes. This form is characterized by marked constitutional symptoms (fever and prostration) which further distinguish it from the original form described by von Hebra. Furthermore, it has been noted that this rare form of erythema multiforme affects the mucous membrane without involving the skin.[2] In 1922, Stevens and Johnson[3] described a "new eruptive fever associated with stomatitis and ophthalmia." Following this report the condition was frequently referred to as Stevens-Johnson disease. Murphy[4] described the condition and believed it to be definitely a pediatric condition. Ageloff,[5] using the term of erythema multiforme bullosa, reported that this condition occurred (in the reported cases) in an age group of 22 months to 16 years. Other cases, reported since Stevens and Johnson, have used a varied, descriptive nomenclature.

It is noteworthy that only the American literature reports a close association of the disease with sequelae destructive to the eyes. In Edmund's[6] opinion serious ocular complications were rare and, when they did occur, were caused by secondary infection. In this country, however, destructive lesions were noted by Stark,[7] Wheeler,[8] Bailey,[9] and Rutherford.[10]

The disease called erythema multiforme is known to occur in several forms. One that is typical, which may well be termed erythema multiforme bullosa, is characterized by a sudden onset, fever, and prostration, a typical iris eruption, a vesicular stomatitis, and a diffuse conjunctivitis of varying degrees. The vesicles of the mucous membranes of the mouth soon rupture, leaving a raw inflamed area. The fauces may be inflamed and edematous. The conjunctiva is usually involved to some degree but, as a rule, somewhat mildly. Severe types may show chemosis, subconjunctival and conjunctival hemorrhage, and, occasionally, corneal ulcer and symblepharon. The causative agent is unknown, and all reports in the past have noted normal or variable laboratory findings, including blood counts, blood culture, smears and cultures of the lesions, and chemistry of the blood.

A probable causative factor was suggested by Chick and Witzberger[11] who because they found Vincent's organisms, believed that spirocheticidal therapy

ought to be tried in such cases. Other workers have not been able to verify this relationship.

That erythema multiforme bullosa is not a rare disease is evidenced by the admission to a hospital of seven cases within a period of six months. These seven cases need not be reported in detail since the symptoms are entirely typical and similar in each case so far as the dermatologic aspect is concerned.

Case 1. A man, aged 18 years, was admitted to the hospital with a case of nasopharyngitis. His temperature was 100.4°F. Examination revealed injection and swelling of throat and uvula and vesicles on the mucous membrane of the mouth. Some of the vesicles had ruptured, leaving raw inflamed areas. There was one ruptured vesicle on the glans penis. The conjunctiva was mildly injected, with slight mucoid nonpurulent discharge. The patient was entirely cured within three weeks. The conjunctivitis was treated with boric irrigations and instillation of 5-percent sulfathiazole ointment.

Case 2. A man, aged 18 years, was admitted to the hospital with a case of nasopharyngitis. His temperature was 101.4°F. The conjunctiva, moderately injected, secreted a mucoid discharge. Within 24 hours, vesicles developed on the buccal surfaces, and the mucoid conjunctival secretion became slightly purulent. Smears taken from the mouth and fauces were positive for Vincent's infection. The patient was entirely cured in 13 days. Treatment consisted of nicotinic acid (200 mg. daily). Ocular treatment consisted of boric irrigations and sulfathiazole ointment.

Case 3. A man, aged 24 years, was admitted to the hospital with a case of Vincent's infection. Examination revealed bullae and ruptured vesicles of the mucous membrane of the mouth and of the penis. He gave the history of having had three previous attacks, always occurring in the spring and fall. The conjunctiva was mildly injected, and there was a slight mucoid discharge. In this case, it was thought advisable to observe the effects of a course of penicillin. He received 1,000,000 units (intramuscularly) within a period of three days. No unusual effects on the course of the disease were noted.

Case 4. A young man, aged 21 years, was admitted to the hospital with the diagnosis of a case of thrush. He gave a history of having had his first attack of the disease in the spring of 1941, four years previously. Since then he had had a yearly occurrence in the spring of each year. At admission, only mouth and penile lesions were noted, but within five days the typical skin picture was presented. Among the bullae in the mouth and on the glans penis were several which had ruptured. The patient's temperature never rose above 99°F. The conjunctiva was mildly injected, with a mucoid discharge. The patient was well in 14 days, receiving the usual treatment of nicotinic acid combined with calcium gluconate. The ocular treatment was the same as in the other cases.

Case 5. A man, aged 23 years, was admitted to the hospital with an upper-respiratory infection. The patient complained of irritation of the eyes and throat. Examination revealed bullae of the skin, the buccal surfaces, and on the glans penis. The conjunctiva in this case was intensely hyperemic and hemorrhagic, both bulbar and palpebral portions being involved. There was a constant flow of bloody secretion from both eyes. The tears were deep scarlet in color, giving a startling effect as they ran down his

cheeks. The patient was acutely ill and prostrated. His temperature varied between 101° and 103°F. The conjunctiva was bathed every two hours with a penicillin solution (500 units per 1 c.c.) followed by an instillation of 5-percent sulfathiazole ointment. Systemic treatment was the same as for the other cases. Within three days the profuse secretion ceased, and the conjunctiva became less hemorrhagic. Within five days, the latter appeared entirely normal. There was no corneal involvement at any time. No sequelae were noted. Fourteen days after admission, there were still some bullae in the mouth and on the glans penis, but they appeared deflated. Eighteen days after admission the temperature dropped to normal. There were, however, bullae still present in the mouth.

Case 6. A young man, aged 23 years, was admitted to the hospital with a case of nasopharyngitis. He presented the typical iris lesions on the soles, abdomen, trunk, arms, and legs. The lesions were maculopapular with vesicular centers. There was one small bulla in the mouth. This patient had no ocular complaints, and results of ocular examination were entirely normal. However, he received the same treatment as the other patients.

Case 7. This patient, a man, aged 24 years, experienced the acute episode of this disease at another camp. His record indicates that he was admitted to the hospital in a state of severe prostration, with a temperature of 103°F. He had a profuse vesicular and bullous eruption involving most of the skin and buccal surfaces and the conjunctiva.

Comment

Several interesting points were brought out from the record of the first six acute cases seen: (1) The range of age in this group was from 18 to 24 years. (2) All cases occurred in males. (3) In two of the six cases, smears from the mouth and fauces showed Vincent's infection. (4) From a systemic viewpoint, five of the cases were comparatively mild; yet they presented bullous lesions in the mouth, and four of them on the glans penis. All five of these patients complained of conjunctival irritation, and all showed mild hyperemia. In no case was the secretion frankly purulent.

Of the seven cases, case 5 was the most severe. There was marked prostration, fever, and dramatic bleeding from the conjunctiva. The secretion, however, never became purulent.

All patients received warm boric irrigations followed by the instillation of 5-percent sulfathiazole ointment into the cul-de-sacs. The one severe case was treated, in addition, with instillations of a penicillin solution every two hours. None of the patients suffered severe ocular complications. All were treated systemically with nicotinic acid and calcium gluconate and one received 1,000,000 units of penicillin (intramuscularly) without remarkable results.

Four of the six cases showed little, if any, skin lesions. The manifestations were confined to the mouth and penis. These four can truly be designated examples of Stevens-Johnson disease.

All of the patients, when admitted to the hospital, were diagnosed as having either nasopharyngitis or Vincent's infection, indicating that some degree of generalized malaise and upper-respiratory symptoms were always present.

The degree of involvement of the mucous membranes of the mouth did not parallel the systemic course of the disease.

Laboratory studies of all cases resulted in normal or variable findings, including blood counts, blood culture, and smear and cultures of the lesions.

The seventh case, which was not seen here during the acute phase, was the only one to exhibit any destructive sequelae. This case had been described as presenting vesicles involving the conjunctiva. When seen here, there was a marked deposition of connective tissue confined to the palpebral tarsal conjunctiva of all the lids. The connective tissue was laid down in whorls, strands, and plaques, so that little normal conjunctiva could be recognized. There was no symblepharon. The patient complained bitterly of conjunctival irritation and the Schirmer test revealed a marked deficit in the lacrimal floor.

Conclusions

The conjunctivitis of erythema multiforme bullosa has been recognized as an entity and has been given a varied and bizarre terminology. The condition is frequently observed, and when disassociated from typical skin lesions is probably not recognized. Each of the cases here reported was associated with some degree of catarrhal conjunctivitis, but none became malignant and destructive, as has frequently been described by various writers. The cause is as uncertain now as it was to von Hebra in 1866. In one of my cases, treatment with penicillin brought about no remarkable improvement. The conjunctivitis apparently is checked by either sulfathiazole or penicillin therapy but, in the series reported, this treatment appears to be prophylactic rather than curative. There seems to be no question that the disease is accompanied by a definite systemic disorder, which may, in turn, invite a secondary infection, causing some of the virulent effects reported in the literature.

The association of herpes simplex to erythema multiforme, as recently reported by Anderson,[12] may also give some clue to the cause of the more serious cases. It remains to be seen whether the advent of sulfa drugs and penicillin will have any deterrent effect upon virulent cases.

238 West Wisconsin Avenue (3).

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NOTES, CASES, INSTRUMENTS

RETINAL VENOUS SHEATHING IN MULTIPLE SCLEROSIS: REPORT OF A CASE

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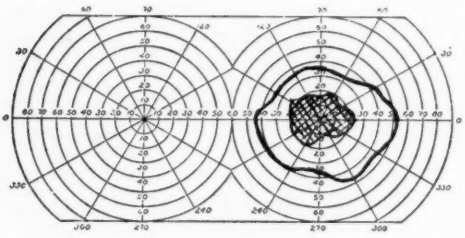
Mankato, Minnesota

Since the description by Rucker,[1] in 1944, of sheathing of retinal veins in some cases of multiple sclerosis, no confirmatory reports have appeared in the literature. The case to be reported here resembles those he described and seems to shed light on the nature of the sheathing. Stimulated by the aforementioned article and having had the privilege of observing some of the cases there reported, I was on the lookout for retinal venous sheathing in the cases of multiple sclerosis which came under my observation.



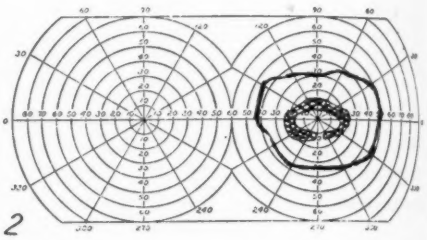


Fig. 1 (Johnson). Fields plotted on June 9, 1944, with 35/330 white target. Dense central scotoma and peripheral contraction in right eye. Fig. 2, Fields plotted on February 3, 1945, with 3/330 white target. Ring scotoma.

REPORT OF CASE

A white woman, aged 20 years, complained on June 5, 1944, that she had lost the vision of her right eye three days previously. Visual acuity in the right eye was reduced to perception of motion and that of the left was 20/20. Fields were charted weekly for five weeks. Perimetric fields, plotted on June 9, 1944, with the 35/330 white target demonstrated a dense scotoma in the field of the right eye (fig. 1).

Repeated ophthalmoscopic examinations showed no evidence of any inflammation of the nerve head. On June 9, and July 14, 1944, notations were made that no perivenous sheathing was found. On the latter date, six weeks after the onset of visual loss, the acuity and fields were normal. The tentative assumption at this time was that this was the first episode in multiple sclerosis and that in later years other symptoms would present themselves.

Fig. 3 (Johnson). The fundus of the right eye on November 6, 1945, showing two small white plaques overlying a branch of the superior temporal retinal vein about four disc diameters from the nerve head. The dark shadow below the center of the picture is an artifact.

On February 3, 1945, there was again a diminution of visual acuity in the right eye, vision being 20/40 in the right eye and 20/20 in the left. At this time there was a ring scotoma in the field of the right eye (fig. 2). Ophthalmoscopic examination disclosed a moderate pallor of the optic disc, but only a suggestion of pallor in the disc of the left eye. No evidence of perivenous sheathing was found.

In March, 1945, a neurologist, after making a complete examination, confirmed the diagnosis of multiple sclerosis.

On October 26, 1945, fields were again plotted and found to be essentially normal. Visual acuity was 20/20 in each eye. By means of the ophthalmoscope, however, definite sheathing was observed along both superior and inferior temporal branches of the retinal vein in the right eye, about four disc diameters from the nerve head. Two of the plaques are shown in figure 3.

This case indicates that the thin sheathing of retinal veins encountered in some cases of multiple sclerosis is not congenital tissue, but that it appears during the course of the disease of the central nervous system. Rucker,[2] in a second series, had no case such as this, in which careful ophthalmoscopic examination had been made prior to the finding of sheathing, and thus was unable to state when it appeared.

839 Belgrade Avenue.

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TANTALUM ENUCLEATION IMPLANT

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The high incidence of enucleations observed in the Armed Forces has accentuated the problem of orbital implants. I have used vitallium spheres and lucite spheres and have also observed postoperatively their use by other surgeons. The percentage of rotation out of the muscle cone was frequent enough to be considered diappointing. The percentage of extrusion of the implants was also disproportionately large. I have not used nor seen the results of the implant described by Eggers.[1]

After observing the many excellent results obtained by the brain surgeons in using tantalum plates in repairing cranial defects, I was prompted to experiment with the same element in making orbital implants.

Tantalum has a characteristic bluish-gray color, having a density of 16.6 gm. per cubic centimeter. It compares favorably with stainless steel in its drawing,

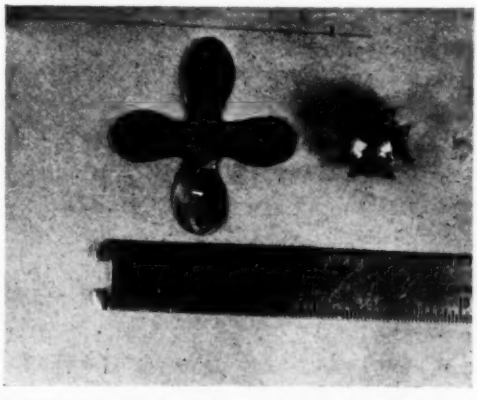

Fig. 1 (Jensen). Four-leaf pattern of tantalum, and leaves bent to form a round cup.

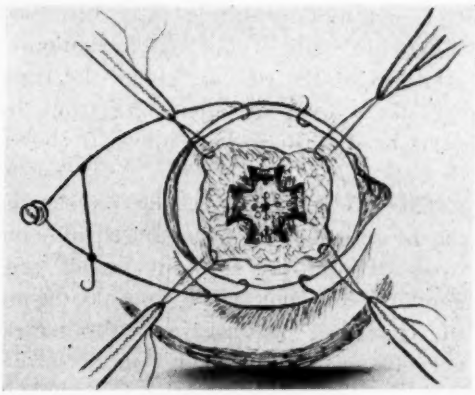

Fig. 2 (Jensen). Operation to insert implant.

stamping, or forming characteristics. The chief value of tantalum to the surgeon lies in its chemical property, which permits cells to obtain their normal growth unhampered. Some investigators have demonstrated the attachment of fibroblasts to the metal itself.

The implant was made by using a .015-in. thickness of tantalum. With the aid of tin shears, a four-leaf pattern was made (fig. 1). The plate was then bent into a round cup shape with concave-shaped leaves.

The enucleation operation was performed in the usual manner. The four recti muscles were tied separately, and the insertions were drawn anterior to the equator of the implant. The muscle sutures were inserted through the perforations and tied over the center of the implant. Considerable care was exercised in closing Tenon's capsule with interrupted catgut sutures. The conjunctiva was closed with black-silk, mattress sutures (fig. 2).

Fig. 3 (Jensen). Good socket the result of tantalum implant.

This procedure was used in seven cases. During a period of six months, no rotation or extrusion was observed. The implant obtained an excellent socket (fig. 3), allowing good rotation.

1315 Medical and Dental Building (1).

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PENETRATING WOUNDS OF THE CORNEA WITH HYPOPYON TREATED WITH PENICILLIN

Case report

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New York

N. B., a boy aged 6½ years, on August 28, 1945, received a penetrating injury to the cornea of the right eye from a steel table fork. He was seen by me the next day. Examination showed a hard eye with two penetrating wounds of the cornea, 4 mm. apart, in the 1- and 8-o'clock positions. The epithelium and substantia propria surrounding the wounds were cloudy. The iris was torn in two places opposite the corneal wounds. The anterior lens capsule was split in its upper third, and swollen opaque lens fibers extruded through the rent. A 3-mm. hypopyon was present. There were ciliary injection, lacrimation, and photophobia. Visual acuity was: R.E. light projection; L.E. 20/50+2 corrected to 20/20 by a +1.50D. sph. ⌒ +.50D. cyl. ax. 90°.

The fundus of the right eye could not be seen because of the cloudy media. No foreign body was found. The other fundus and media were normal.

The hypopyon was a direct result of infection introduced by penetration of the anterior chamber. The lens was injured, infected, and offered an excellent medium for the development of suppuration. The glaucoma was due to a narrowed filtration angle produced by the swollen lens, combined with obstruction of the trabeculae by a plasmoid aqueous. Two anterior synechiae, between the injured iris and corneal wounds, were present.

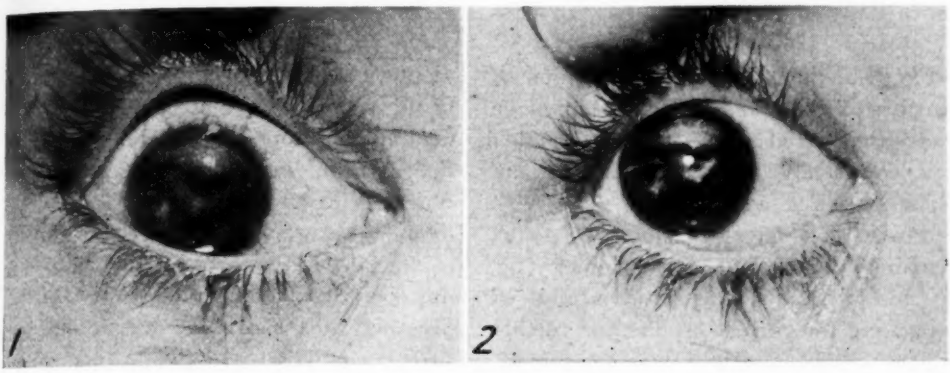

Fig. 1 (Ingalls). Photograph of left eye on the fifth postoperative day, showing considerable lens cortex in the anterior chamber. Fig. 2, Photograph of left eye two months after operation, showing secondary membrane in pupillary area.

The operation selected was a linear extraction of the lens with complete iridectomy. Substitution of a solution of penicillin for the usual saline irrigation was the innovation which may be of value in this type of case.

Following avertin and ether anesthesia, the skin of the lids and brow was prepared with iodine and alcohol. Solutions of argyrol and adrenalin were instilled into the conjunctival sac; Castroviejo lid clamps were applied; a superior-rectus bridle suture was passed. A fixation forceps was applied below the limbus at the 6-o'clock position, and a keratome incision was made in the cornea, 2 mm. below the limbus, at the 12-o'clock position. The anterior capsule of the lens was entered by the keratome. The anterior synechiae were broken by a spatula, and a complete iridectomy at the 12-o'clock position was performed. Thirty cubic centimeters of normal saline, followed by 20 c.c. of penicillin solution containing 3,300 units per c.c., were flushed through the anterior chamber. This washed out the hypopyon and several fragments of lens material. A drop of 3-percent atropine was placed in the conjunctival sac, with an ointment of calcium penicillin containing 1,000 units per gram. Both eyes were dressed and protected by a double Ring mask.

An injection of 1,500 units of antitetanus serum was given intramuscularly at the time of operation, and typhoid vaccine, in the amount of two million organisms, was given intravenously the following morning, 14 hours after the anesthesia.

On admission, rectal temperature was 100.6°F. and, the following day at 12 o'clock, was 101°F. (a questionable reaction to the foreign-protein therapy).

On August 30th, at the first dressing,

the anterior chamber was filled with cortex, and there was a moderate postoperative reaction.

On the following day, the iris pillars were in good position, and the anterior chamber was still full of cortex. On September 1st, the cornea had regained its normal luster.

At this time intramuscular injections of penicillin were started as an additional safeguard; 10,000 units were given three times daily and continued for six days (a total of 170,000 units).

On September 2d, some absorption of lens cortex had taken place; the hypopyon had disappeared; the anterior chamber had completely re-formed and no anterior synechiae were present.

Three days later, considerable cortex remained in the anterior chamber (fig. 1), and the question of the advisability of reopening the corneal wound for further irrigation with penicillin was considered; however, after consultation with Dr. John H. Dunnington, it was decided to await developments.

Improvement continued, and the patient was discharged from the hospital on September 10th.

The eye continued to improve, and examination on October 29th showed a clear cornea, except for two scars, a small string adhesion between the temporal pillar of the iris and the upper corneal wound (fig. 2). There was an atrophic area in the iris, at the 8-o'clock position, which extended along the pupillary border to the 9-o'clock position. The central area of the pupil was partially occupied by thickened lens capsule dotted with pigment; the temporal iris border of the pupil was adherent to the lens capsule by a narrow posterior synechia. Tension in each eye was normal to fingers.

On October 31st, an estimate of 2.00 diopters of irregular corneal astigmatism in the right eye was obtained by the use of the Javal ophthalmometer (this was not accurate because of poor coöperation). With a correcting lens of +7.00 diopters before the right eye, the patient could count fingers at three feet. The fundus could not be examined because of the presence of a secondary membrane, but there was a good reflex. The fundus and media of the left eye were normal.

At a later date, a discission will be done. The remaining synechia may be separated at the same time.

This report is made to call attention to the possible value of this method of therapy in cases of infected penetrating wounds of the eye.

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SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

LOS ANGELES SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

SECTION ON OPHTHALMOLOGY

September 17, 1945

DR. ORRIE E. GHRIST, *presiding*

THE ROLE OF GLASSES, AMBLYOPIA, ORTHOPTICS, AND SURGERY IN THE TREATMENT OF STRABISMUS

DR. SAMUEL ABRAHAM reported on a study of 551 cases of nonparalytic divergent strabismus in which the error of refraction of the two eyes was not sufficient to warrant a consideration of aniseikonia as a factor. He stated that no ocular pathologic change was present. In other words, his report covered all cases of strabismus in which the error of refraction in the two eyes was approximately equal and in which it could be presumed that at the onset of the condition the vision was probably equal in the two eyes. Dr. Abraham said that glasses were prescribed in 307 of these cases with resulting straightened eyes in 109 (35.6 percent). As to the types of cases, 115 were of the periodic type; 192 of the constant type. Eight patients (69.5 percent) of the periodic type were helped by glasses alone, according to Dr. Abraham, whereas 29 (only 15 percent) of the constant type were helped by glasses alone.

The results were considerably better when the cases were treated within six months of the onset, especially those of the unilateral constant type. Among 144 cases of the unilateral type of constant strabismus, only 12 (8.3 percent) responded to glasses when treated more than six months after the onset. When treated within six months of the onset, which, he said, happened too infrequently, 45.9 percent responded to glasses.

Examination of the cases revealed that those helped by glasses showed considerably less difference in corrected vision in the two eyes than those not helped by glasses. The difference in vision between the two eyes in those helped averaged about 0.3, whereas the difference in vision of those not helped averaged 0.6.

An improvement in vision by treating the amblyopia in the cases of unilateral strabismus resulted in cure of strabismus in 29 out of 60 cases so treated. In 30 of the 31 remaining cases, the vision in the ametropic eye improved to within 0.1 of that of the other eye, with the result that the strabismus became alternating. It was obvious, according to Dr. Abraham, that treatment of the amblyopia was a definite help in the cure of strabismus and results of the surgery showed that the time taken to give such treatment was well spent.

Surgery in 51 cases resulted in a cure in 45 cases (88.2 percent); that is, functional cure, not cosmetic cure. No case was considered ready for surgery in this group of cases unless the vision in the two eyes was approximately equal.

Orthoptics in Dr. Abraham's report was limited in its meaning to that form of treatment which aimed to reëducate the cerebral area in the production of normal binocular vision and definitely did not include treatment with glasses or treatment of amblyopia. In no case where orthoptic treatment alone was given were any results seen. Where orthoptics was combined with treatment with glasses and amblyopic treatment, the results were never better than in the large group of

cases herein reported without recourse to orthoptics. The results of surgery reported were the results in patients given no orthoptic treatment.

Dr. Abraham's report emphasized that functional cure could be obtained in a very high percentage of cases after error of the refraction, the amblyopia, and the possible structural defects had been given proper attention.

He concluded that there seemed to be no need for considering orthoptics in the treatment of most cases of the nonparalytic convergent strabismus seen.

Discussion. Dr. Harold F. Wahlman pointed out that enthusiasts of one or another method for treatment of strabismus tended to overemphasize their own talent or subject. He agreed with Dr. Abraham that it was necessary to consider all the methods of treatment for strabismus and to use all of them to advantage.

Dr. Wahlman raised the question as to whether the amblyopia in strabismus might not often be due to a mild retrobulbar neuritis which occurs in the course of exanthematous diseases in childhood. It was common knowledge, he said, that the history of a squint frequently contained reference to its onset following an exanthematous disease in childhood. He queried whether the retrobulbar neuritis might not be temporary or permanent, and in its permanent form might not explain some of the cases of amblyopia ex anopsia that were resistant to occlusion or other forms of orthoptic therapy.

Dr. Whalman emphasized that many of the structural changes in cases of strabismus seen at the time of operation, might be hereditary. He stated that he had frequently been perplexed to explain why many patients' strabismus straightened out very well under the anesthetic before the operation had been performed, when the fusion faculty had been eliminated by the anesthetic. He was interested to know if anyone could explain the mechanism of such straightening.

Dr. C. H. Albaugh said that he had frequently found it difficult to understand the structural changes seen at time of operation in strabismus of short duration, and was often concerned as to what part this might play, particularly in view of the principle elucidated by Dr. Walter Lancaster of Boston; namely, that each extraocular muscle is more powerful than would be normally required by the job it has to do. Dr. Albaugh also mentioned the factor of partial paralysis of elevator muscles as playing a part in the cause of strabismus.

Dr. Abraham, in closing, said that he had not had sufficient time to discuss the problem of hyperphoria in strabismus, but that he felt that it was very unreliable to try to measure any such hyperphoria in the presence of a high degree of squint because of the tendency of an eye to drift in any direction. He said that he was unable to agree with Dr. Wahlman concerning retrobulbar neuritis as an explanation for amblyopia ex anopsia, but did not wish to take up the time to discuss his reasons for disagreement.

C. H. Albaugh,
Reporter.

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

October 1, 1945

MAURICE L. WIESELTHIER, M.D., *presiding*

THE MARK J. SCHOENBERG MEMORIAL MEETING

Dr. Schoenberg, one of the founders of the New York Society for Clinical Ophthalmology, and its first president, was devoted to phases of ophthalmology in which he had performed pioneering work and in which he had a special interest.

Checking of Tonometers

Dr. Adolph Posner set up a tonometer-checking station for the first part of the instructional hour.

Exhibit on Glaucoma

The National Society for the Prevention of Blindness presented an exhibit on glaucoma to complete the instructional hour.

Glaucoma: Some Suggested Etiologic Factors

Dr. Ferdinand L. P. Koch presented a modified summary of unpublished notes and data of Dr. Mark J. Schoenberg as a synopsis of some of his views concerning etiologic factors of glaucoma. Dr. Schoenberg established a syndrome of symptoms from disturbances of metabolism within the tissues of the eye which altered the equilibrium of the mechanism regulating the intraocular pressure, resulting in a lowering of the threshold within the eye to the stimuli from various parts of the body.

Dr. Schoenberg believed that there must be some missing factor which probably would be found in a consideration of a principle of general physiology which may be stated as follows: (1) the exchange of food and stimuli between that organ and the rest of the organism; (2) the performance of the special function determined by its own anatomic structure. Thus, the function of any organ depends not only upon the impulses, nutrition, and stimuli that are received from the rest of the organism but also upon its independent, specialized, and, therefore, complex structure, which functions as a sort of governor, permitting the organ to maintain its purposive function despite external interference or even lack of external assistance, while simultaneously modifying the effect of stimuli from elsewhere.

The "principle of relative organ autonomy" implies, in the eye, the existence of a stabilizing mechanism to reduce to a proper and harmless degree the continuous stimuli reaching it. This is particularly important since food and stimuli constantly are entering the visual organ in various quantities and intensities, and this would result in varying degrees of functional inefficiency if no regulatory mechanism were present for constant maintenance at a certain level of both nutrition and tension. These levels may vary slightly within very narrow limits.

Certain circumstances or conditions external to the eye—such as: emotional aberrances, abnormalities of blood pressure, physical fatigue, decreased systemic resistance with inflammatory episodes, endocrine disturbances as well as those of metabolism, and others—which may induce some elevation or depression of the intraocular pressure beyond the limits of normal, may manifest themselves in the eye through alterations of: (1) capillary pressure in the uvea; (2) vascular permeability; (3) impairment of ocular drainage; or (4) some combination of the three. The fact that the intraocular pressure, in the great majority of such general situations as have just been mentioned, tends to remain within normal limits appears to suggest the presence of an ocular-tension-stabilizing mechanism. Similarly, since it is not sufficient merely that nutrition, stimuli, and hormones be brought to the tissues, but that these be utilized normally, it might be assumed that a local regulatory factor for these activities must be present.

The theory of an autonomous mechanism assumes that a certain substance or substances are available constantly to control ingress and egress of fluids, gases, and stimuli that determine the normal maintenance of intraocular pressure as

well as the normal metabolism of lens, vitreous, retina, and optic nerve. This assumption implies the secretion of a substance produced in the ciliary processes, which alone of the ocular tissues have a location and form, in addition to their physiologic and histologic characteristics, suited to the secretion of such substances. The functions of these secretions are presumably capillarotonic, neurotrophic, and the maintenance of equilibrium between ocular-fluid inflow and outflow.

The inability of the vitreous to absorb more fluid than it already contains can be reconciled with the many indications that swelling of the vitreous occurs in glaucoma by assuming that the ciliary processes furnish to the vitreous an increased amount of so-called residual protein which seems to constitute its hydrophilic substance.

The continued progression of glaucomatous optic atrophy after a successfully performed decompression operation, which should be arrested if hypertension were the only cause, may indicate the presence in such eyes of a toxic substance that continues to effect a failing of the function of the neurotrophic-producing substance of the ciliary processes necessary for the nutrition of the optic-nerve fibers.

Relaxation of the capillary tonus with dilation increases capillary permeability. In addition to the remote control of the vegetative nervous system, it is conceivable that the ciliary processes furnish a secretion, the failure of which results in various degrees of capillary dilation.

Draining of the ocular fluids (aqueous, intercellular fluid, and venous blood) is, then, more than merely a mechanical problem. Normally, only as much blood as the tissues demand enters the finest arterioles and capillaries, and the local venous system is adequate for its drainage. Similarly, only as much aqueous as the pectinate ligament, Schlemm's canal, and the perivascular spaces can drain off enters the eye by filtration, dialysis, or secretion. The delicate adjustment is inhibited or stimulated through the vegetative nervous system and the substances furnished by the ciliary processes. If the latter fail, the efficacy of the drainage system may be greatly reduced.

Accordingly, the factors determining maintenance of normal intraocular pressure and nutritional equilibrium are: (1) capillary circulation; (2) physico-chemical constitution of the blood; (3) mechanical agencies and structure of the globe; (4) the secretion of the ciliary processes. Any one of these may undergo alteration, with subsequent incoördination of the others, and produce various types of glaucoma which may be classified as belonging to the vascular, metabolic, drainage, mechanical, and secretory, or to the mixed groups. Buphthalmos would be placed in the drainage category; acute glaucoma in the vascular and secretory group; simple glaucoma in the secretory group only; an absolute glaucoma would represent terminal stages of the mixed types.

Another principle of general physiology is that stimuli will have an effect upon a given tissue or organ only when their intensity is sufficient to cross the threshold of resistance, which varies within definite and narrow limits. It is chiefly in organs that are congenitally inferior or diseased that the stimuli are able to cross the threshold and produce symptoms. One of the fundamental changes in glaucomatous eyes is the lowering of the threshold against the entrance of depressing stimuli originating in any part of the organism. Diseases of other organs or systems are not directly the cause of glaucoma, although if deviations from the normal are present in the eye and the threshold is lowered to stimuli which ordinarily would

produce no pathologic effects, they may unchain the glaucoma syndrome. This fact justifies the use of many provocative procedures which indicate no abnormal results in normal eyes, but which yield hypertensive values in glaucomatous eyes when, presumably, the threshold is lowered to the entrance of stimuli from both within and without the eye.

Experiences in scleral resection

Dr. Donald W. Bogart said that Dr. Schoenberg was the first ophthalmologist in this country to attempt the operation for the cure of retinal detachment. He had studied at the Gonin Clinic in Zürich and returned to this country to be the first to perform Gonin's operation at the Knapp Hospital.

The need for a new technique in the surgery of retinal separation has long been apparent. This new procedure may be designated, for want of a better name, "scleral resection for the relief of retinal detachment." It assumes a shrinkage of vitreous with a resultant need for shortening the globe slightly to meet the detached retina with its adhesions to the vitreous. The operation is performed as follows: The sclera is cleared of the appropriate rectus muscle in relation to the detachment. Silk sutures are placed in the muscle for later replacement to its cut stump. Tenon's capsule and any adhesions are cleared.

A 5 by 12 or 14-mm. segment is marked, overlying the equator at the site of the detachment. If such a piece is over the long posterior ciliary artery, part of the segment is removed above and part below it. Two "whip-type" sutures, tied at the ends and placed so as to overlap the proposed incision, are left untied at the middle part. Pulling the two loose ends enables one to close the incision in the manner of lacing a shoe. Tying may be done at any time, if complications should arise. These sutures are laid aside to permit clear view and removal of the segment. The incision in the sclera is made down to the choroid with a specially designed knife, the blade of which has a sharpened end and a serrated side that guides the surgeon as to the depth of the incision. The latter is made laterally for 5 to 10 mm. and then lengthened to the ends of the marked segment on one side by a scleratome designed especially to protect the choroid by cutting only with its sides.

After exposure of the choroid, the segment is removed with scissors. New forceps have been developed to hold the sclera while this incision is made. Usually, at this point, the subretinal fluid evacuates itself, because of cystic or thinned choroidal areas. The sutures are now drawn up, tied (reinforcement sutures may be used if necessary), and buried.

The area about the closed wound is surface coagulated with a specially designed spatula heated in an alcohol lamp. A limited area is coagulated; the needle is retempered by plunging it at once in sterile albolene. One or two igni punctures are made with a needle heated in the flame to make certain that all subretinal fluid is evacuated. Ophthalmoscopic control is used during the operation. This procedure is simpler than is diathermy puncture, produces less general ocular reaction, and causes less discomfort to the patient. The muscle is sewed in place, sutures are buried, and the conjunctiva is sewed with running silk. If a tear is present elsewhere, it is sealed off with three or four igni punctures. As a final procedure, 1 c.c. of sterile air is injected into the anterior chamber, after the latter has been penetrated by a Wheeler-type knife, in order to force the sclera, choroid, and retina into apposition. This bubble of air helps restore the eye to normal tension. A 3-percent solution of atropine

is instilled, and both eyes are covered. Convalescent treatment includes bed rest for two weeks and the wearing of pinhole spectacles for three to four months.

Eighteen eyes, all considered inoperable by the usual methods, were operated upon. Ten of these had been operated on before; 10 were aphakic; three required a second operation. The results were classified on the basis of the degree of reattachment and final vision in relation to the preoperatively estimated *possible* vision (judging by the retinal status; that is, macular damage, hemorrhage). In seven cases the cure was complete; in seven, three-quarters or more reattachment was effected with one-half to three-fourths the possible vision; in three, there was one-quarter to one-half reattachment with one-fourth possible vision; one was a failure.

Myopia was reduced as a result of the operation.

This operation is much less radical than are those previously employed. It is hoped that its adoption, along with the use of the simplifying instruments, will partially solve the problem of retinal separation.

Ocular drainage

Dr. M. Uribe Troncoso opened his address with a brief review of the theories advanced to explain the outflow of the aqueous from the anterior chamber. He mentioned Leber's idea of a continuous current of fluid through Schlemm's canal as well as the theory of dialyzation of the aqueous directly through the blood vessels by an intermittent outflow, a theory which was adopted in part by Duke-Elder. Drs. Troncoso, Friedenwald, and Pierce denied the dialyzation theory and showed that a continuous, although slow, current of aqueous runs out of the chamber angle. Dr. Troncoso estimated that the rate of outflow was about 2 c.c. per minute, and Drs. Friedenwald and Pierce considered it no larger than 1 to 1.5 c.c. per minute.

The majority of authors who have experimented with animal eyes have stated that the mechanism of the liquid outflow is the same as that in man. The absorption of aqueous is made by osmotic and hydrostatic pressure through the barrier of the vessel walls (blood-aqueous barrier). By detailed study of the comparative anatomy of the angle of the anterior chamber in Mammalia, Dr. Troncoso has shown that there is no Schlemm's canal in the lower Mammalia and that aqueous is absorbed directly through the trabecular veins, which are the superficial branches of the intrascleral venous plexus. In the Primates, Schlemm's canal appears as a distinct anatomic landmark. Its inner wall is covered by the trabeculum, and the aqueous is absorbed directly through it into its lumen. Gonioscopy has shown that, in the living eye, Schlemm's canal is filled, not with blood, but with transparent fluid, the aqueous. However, in pathologic conditions, blood may be seen streaming inside the lumen. This change can also be brought about by tapping the anterior chamber, as Kronfeld and McGarry have demonstrated. Dr. Troncoso believes that, contrary to what happens in the lower Mammalia, in Primates (monkey and man) there is no blood-aqueous barrier, but the aqueous is absorbed directly into Schlemm's canal and from it trickles constantly into the blood stream, without the interposition of a vascular wall.

The effects of radiation on the eye

Dr. Algernon B. Reese said that cataract, the most serious complication from irradiation, starts subcapsularly at the posterior pole and usually remains stationary, with surprisingly good vision. Even when dense, the vision may be

20/30. If the lesion progresses, changes appear insidiously under the anterior capsule, usually two to four years after exposure. Eventually, the lens becomes totally opaque.

The histologic change is necrosis and proliferation of the lens epithelium which produce malformed lens cells and metaplastic fibrous tissue under the posterior and anterior capsule.

Any dose of irradiation capable of producing a therapeutic effect can also result in cataract, if the lens is exposed. No measures, even when expertly applied, can give absolute assurance of adequate protection to the eye. Less than one skin-erythema dose produces a cataract. This is less than the amount needed to produce epilation of the cilia. A dose which will induce no immediate effect (such as conjunctivitis, irritation, or demonstrable changes in the eye) may produce a cataract. Even the spilling from the X-ray tube in treatment of carcinoma of the breast, mouth, and neck, may have this effect on the lens.

A radiation cataract seems less likely to develop in younger than in older people. In the treatment of retinoblastoma, we give 8,000 r at each of two portals, and cataract is a rare occurrence.

If the changes progress sufficiently, surgery is indicated for the treatment of radiation cataract. An intracapsular extraction is definitely preferred, for in extracapsular extraction, the lens epithelium continues to proliferate and form metaplastic, fibrous tissue in the anterior chamber.

Irradiation tends to keratinize epithelium. Keratinization of the corneal epithelium may be particularly annoying. It may occur even following moderate doses of irradiation. In its early stages, this keratinization appears as numerous punctate areas, staining with fluorescein, and may develop into an actual vascularized pannus. Since the patient is usually directed to close the eyes, these changes are confined to the lower portion of the cornea. When keratinization takes place along the lid margin, it is seen as an extension of a gray line to the posterior margin of the lid or on to the palpebral conjunctiva.

Among the other irradiation effects are: (1) trichiasis, loss of cilia, and regrowth of white cilia; (2) atrophy of the tarsus which, perhaps, accounts for the widening of the palpebral aperture sometimes seen on the side exposed to irradiation; (3) disappearance of the firm elastic tissue along the lid margin, which becomes quite soft and pliable; (4) glaucoma, apparently due to an iridocyclitis rather than stoppage of the trabecular spaces with pigment granules, as sometimes stated; (5) proliferation and migration of the pigmented epithelium of the iris, especially over the lower half (seen as an increase in the number of the clump cells, the appearance of pigment dust over the surface of the iris, and the appearance of pigment deposits on the posterior surface of the cornea); (6) atrophy of the pigmented epithelium of the iris (especially around the pupillary margin and over the posterior surface of the iris in its lower half), permitting light to pass through readily; (7) atrophy of a sector of the iris stroma; (8) later, from six months to two years following the irradiation, vascular phenomena in the retina, such as occlusion of an arteriole or of a vein, the appearance of hard, white deposits, and hemorrhages.

As a result of very heavy irradiation, the central portion of the cornea, or a portion of the sclera (if the focus of the irradiation has been directed over it) may become necrotic and act as a sequestrum. Heavy irradiation may cause necrosis of the conjunctiva, which leads to shrinkage and adhesions between the lids and the

globe, sometimes producing total symblepharon.

In conclusion, three cases of bilateral retinoblastoma, with enucleation of the eye with the more advanced stage and irradiation of the other eye, were reported. In these cases, the heavy X-ray therapy precipitated a malignant neoplasm after arresting the original tumor. In one case, after the patient had had normal vision for eight years, a rhabdomyosarcoma of the temporal muscle developed over the site of a portal for the administration of the irradiation of the eye. This tumor proved to be fatal. At necropsy, it was found that the retinoblastoma, for which the irradiation had been given, was completely arrested. The microscopic examination of the retinal lesion showed tumor cells which did not look necrotic; apparently, however, these cells had lost their power to proliferate and remained in a suspended state of viability following the irradiation. Another patient developed a malignant tumor that also proved fatal to the tissues in the pathway of the heavy irradiation of the eye. A biopsy specimen was taken, but the tissue was necrotic, and the type of the secondary growth was not determined. The third case, seen by Dr. Mark Schoenberg in 1916, was not subjected to the bilateral enucleation customary at that time, but after enucleation of the eye with the more advanced lesion the patient was sent to Memorial Hospital for treatment by irradiation. The retinoblastoma was successfully arrested, and the patient had 20/30 vision for 27 years. In 1943, a tumor appeared in the temporal region over the site of a portal of treatment. This tumor grew rapidly and proved fatal in July, 1944. The pathologic diagnosis was postirradiation scar-tissue sarcoma.

Irradiation of the region of the eye is never indicated unless the condition for which it is given is serious enough to justify a treatment that always may jeopardize the eye.

Pupillography in the Early Diagnosis of Chronic Simple Glaucoma

Dr. Otto Lowenstein said that Mark Schoenberg's last great scientific love was pupillography in connection with the problems of simple glaucoma. In 1941, when they had first investigated the early signs of glaucoma, they thought there might be characteristic pupillographic changes prior to the clinical appearance of manifest symptoms. These might shed light on a nervous factor in the origin of simple glaucoma and simultaneously establish a basis for the diagnosis at a preclinical stage. The studies consisted of following, pupillographically, cases of simple glaucoma and trying to discover whether or not a parallelism existed between consecutive stages of the disease and pupillary disturbances.

A short time previously, Dr. Schoenberg had reclassified simple glaucoma into: (1) a functional spontaneous reversible stage; (2) a predominantly functional stage with slight organic changes; (3) a predominantly organic stage; and (4) the completely organic stage.

It was found that on the basis of pupillography, a purely functional stage does not exist, there being permanent pupillary changes when the clinical symptoms still appear to be functional and spontaneously reversible. In every case these changes showed typical characteristics, differing only in degree, and thereby revealing parallelism with the general development of the disease.

Originally it was believed that these pupillary abnormalities were the expression of destruction caused locally in the iris by the increased intraocular pressure. However, it was found that no cases

of unilateral glaucoma exist in which the seemingly unaffected eye does not show deviations from normalcy on the basis of pupillographic examination.

In previous research, Dr. Lowenstein tried to show how disturbances of pupillary movements in otherwise normal eyes are located either in the sympathetic or parasympathetic centers or pathways. A certain number of symptoms were found to be characteristic of disturbances in part of either the sympathetic or parasympathetic centers.

It was found that certain sympathetic disturbances were present in all of 50 cases of simple glaucoma and that these disturbances, in cases of unilateral glaucoma, included the seemingly unaffected eye. These disturbances could be detected in a very early, preclinical stage of the disease, thus making an early diagnosis possible in otherwise dubious cases. These findings led to the assumption of an at least partly central sympathetic origin of noncongestive simple glaucoma. Demonstrably increased intraocular pressure was shown to be preceded by centrally conditioned pupillary disturbances.

The practical question as to whether or not we may base the diagnosis of simple glaucoma exclusively on pupillographic findings of a central nervous, particularly hypothalamic, type must be answered in the negative. However, where there are clinical ophthalmologic reasons for suspecting the development of simple glaucoma, the absence of central sympathetic disturbances of the type described in cases of simple glaucoma excludes the possibility of glaucoma, whereas their presence makes it likely, although not positive.

Mark Schoenberg died before this work on glaucoma was finished, and pupillographic glaucoma-research work lost its most zealous pioneer and champion. However, the work is being continued.

Discussion. Dr. Bernard Samuels said he once remarked to Dr. Schoenberg that glaucoma like the poor will always be with us. Dr. Schoenberg's characteristic response was that we must do something against it. Whenever he saw anything that was evil, his first reaction was to attempt in some way to alleviate or get rid of it.

Dr. Schoenberg realized that, in the regular meeting of the Section of Ophthalmology of the New York Academy of Medicine, time and opportunity were often lacking for many young men to show their cases and have them discussed. It is just this need which this Clinical Society, founded and organized by him, so admirably fulfills.

In the last years of Dr. Schoenberg's life he found exactly the proper niche for his talents and aspirations in the National Society for the Prevention of Blindness. Up to that time, he had done a great deal in trying to find out the cause of glaucoma.

The papers on glaucoma presented at this meeting bring to mind a condition that is often referred to as malignant postoperative glaucoma. An eye that has suffered from glaucoma simplex, shortly after an operation of whatever kind, may go into a state of inflammatory glaucoma. The anterior chamber is shallow or abolished; the wound gapes a little; the tension is harder than before; the eye is red and painful and goes on to blindness.

Clinically, this type of malignant glaucoma is generally thought to be due to a subchoroidal hemorrhage that has not gone so far as to produce a typical expulsive hemorrhage. Microscopically, however, these eyes as a rule show no subchoroidal hemorrhage, but they do give evidence of a swollen vitreous. The vitreous is pushed forward in the circumlental space, the ciliary processes are com-

pressed and directed forward. This swelling of the vitreous would seem to show that it possesses certain biologic qualities of reaction to stimuli although it possesses no nuclei.

MARK J. SCHOENBERG—AN APPRECIATION

ELEANOR BROWN MERRILL closed the meeting with a tribute to Dr. Schoenberg and a description of his achievements as the chairman of the Committee on Glaucoma of the National Society for the Prevention of Blindness.

Leon H. Ehrlich,
Secretary.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

October 9, 1945

DR. J. WESLEY MCKINNEY, *presiding*

OLD FOREIGN BODY OF THE IRIS

DR. PHILLIP MERIWETHER LEWIS reported a case of a white man, aged 77 years, seen in August, 1945. In 1890, 55 years ago, while working with brass at his trade of machinist, a piece of metal struck him in his right eye. He was seen by an ophthalmologist, who told him that the brass particle had entered his eye and was embedded in the iris. He was advised to leave it alone. Examination showed an almost completely encapsulated metallic foreign body on the anterior surface of the iris near the pupillary border in the superior-temporal quadrant. The foreign body was apparently slightly more than 1 mm. in diameter. The iris in the immediate vicinity was slightly atrophic, but the pupil reacted normally, and no other abnormality of the eye was present. With a +0.25D sph. ⌒ +2.00D. cyl. ax. 180° vision was 20/20. With a +2.50D. sph. addition he could read J1. The left eye was normal externally, but there was a senile degeneration of the macula, and vision could not be improved more than 20/200. Neither eye had ever been inflamed or given any trouble since the accident, 55 years before. The patient still worked regularly as a machinist.

TENONITIS COMPLICATING MUMPS

DR. PHILIP MERIWETHER LEWIS reported the case of a white man, aged 34 years, seen six months previously. Both eyes had been quite red and sore for two days. No pus nor mucus was present. There was marked congestion and edema of both eyes, with limitation of motion and marked tenderness. It was noticed that his face was swollen, and examination disclosed that all of his salivary glands on both sides were swollen and tender on palpation. He was thought to have a bilateral tenonitis complicating an acute infection of the salivary glands. His physician considered him to have mumps. He was treated with hot compresses to the eyes and sulfonamides internally. After about eight days his eyes appeared normal except for a slight scleral congestion. It was then noticed for the first time that the tension seemed elevated. Measurement showed it to be O.D., 35 mm., and O.S., 40 mm. Hg (Schiøtz). There was no evidence of uveitis.

The regular use of miotics had maintained the pressure at about 30 mm. The peripheral fields had remained normal, but the blind spots were slightly enlarged below. The discs have shown no cupping to this date. Apparently the glaucoma was primary. However, might it not be related, or secondary, to the previous acute condition?

CHICAGO OPHTHALMOLOGICAL SOCIETY

October 15, 1945

PETER C. KRONFELD, *president*

CLINICAL MEETING

(Presented by the Department of Ophthalmology, Northwestern University Medical School.)

PRIMARY OPTIC ATROPHY POSSIBLY DUE TO ARACHNOIDITIS

DR. HELEN HOLT presented C. J., aged 60 years, who had experienced progressive loss of vision until he was unable to work, in 1932. Antisyphilitic treatment had been given elsewhere; blood and spinal-fluid tests gave negative results when the patient was admitted to Montgomery Ward Clinic. On examination, visual acuity was R.E. 8/200: L.E. 4/200, and could not be improved. Argyll Robertson pupils were noted. The discs were white, with sharp margins, but the cribriform plate was not visible. When a large target was used, a visual field was demonstrated to be present on the nasal side of each eye, with constriction above. This field and the appearance of the disc suggested a syphilitic arachnoiditis at the chiasm as the etiologic factor. Operation was not indicated at present. The patient was presented to emphasize the necessity of recognizing the condition early to insure preservation of useful vision.

CEREBRAL THROMBOANGIITIS OBLITERANS

DR. HELEN HOLT presented two patients on whom this diagnosis had been made. Mrs. DeP., aged 52 years, had had encephalitis complicating typhoid fever at the age of 19 years. Since 1935 she had been subject to convulsive seizures with loss of consciousness. Encephalograms showed cortical atrophy, especially frontal and occipital. Mild peripheral vasospasm with no evidence of obliterative disease was found. The blood pressure was 164/102. Visual acuity was 20/20; external examination was negative. The retinal vessels showed early arteriosclerotic changes. In addition there had been thrombosis of the superior temporal artery with formation of new vessels just above the macular area. The retina supplied by this vessel was atrophic, with pigment irregularity. The patient illustrates retinal thromboangiitis obliterans with cerebral thromboangiitis obliterans.

Mrs. V., aged 41 years, had what had been diagnosed in retrospect as encephalitis complicating la grippe or influenza in 1942. During convalescence the patient was annoyed by a transient diplopia, but not much paresis could be demonstrated. In January, 1943, a violent headache was followed by aphasia, numbness of the left side of the face and left arm, lasting about one-half hour. Personality difficulties were a constant trial, for she could not adopt an adult status toward her home problems. Psychiatric consultation was of only moderate help. In January, 1945, accommodative ability was lost following a severe headache. Three weeks later alexia for words but not numbers suddenly appeared and has persisted, and a right homonymous hemianopia developed. Peripheral vascular spasm was noted on testing. The encephalogram showed cortical atrophy. A preoperative diagnosis of cerebral thromboangiitis obliterans was made and was confirmed by Dr. Loyal Davis when a right osteoplastic craniotomy was performed. Visual acuity continues to be 20/15. The retinal vessels show no abnormalities. This patient illustrates marked peripheral vasospasm, cerebral thromboangiitis obliterans, with considerable cerebral atrophy and no ocular involvement.

ARACHNOIDITIS

DR. HELEN HOLT said that Mr. J. A. had been presented before this group sev-

eral years ago. In 1936 he had been successfully operated on for a nonspecific arachnoiditis and was presented now to show that visual acuity and peripheral fields are maintained after surgical correction of the constricting bands.

Retinoblastoma

Dr. Helen Holt said that Sandra R., aged 4 years, had undergone an enucleation of the left eye at the age of 18 months because of a retinoblastoma which filled the vitreous cavity. Tumor masses were noted in the right eye. Seven days after the enucleation, September 15, 1942, intensive X-ray therapy was given to the right eye through the temple region and left border of the nose, according to the standards set up by Dr. Reese. Within the next six months a total of 19,800 r was given. The tumor masses flattened and were replaced by shiny white tissue. On the last fundus examination, May 18, 1945, the lenses were clear; no active tumor tissue was visible. No accurate visual acuity could be obtained, but the child seemed to play normally. Her general status has improved remarkably. The prognosis as to life is good and for useful vision fair.

Arteriosclerotic retinopathy complicating cataract

Dr. Helen Holt said that Mrs. H., aged 65 years, had been a known diabetic for 12 years. On admission her blood pressure was 154/90, blood sugar 384. Diabetic management was instituted. Visual acuity was light perception and projection in each eye. Posterior findings were obscured by mature senile cataract. When the diabetes was controlled, intracapsular cataract extraction was performed on the left eye on December 21st, on the right on January 6th. The postoperative course was uneventful. Visual acuity could not be improved above 10/200. In the fundus of the right eye a delicate gray tissue extended into the vitreous in front of the macula, and the macular area was replaced by a yellow atrophic spot with pigmented borders; in the left eye there was a round atrophic spot in the macula about one-fourth disc diameter in size, with a pigment border; just temporal to this was another patch with a pigment band joining the two. Since then, the arteries of the right eye have become almost imperceptible, and the arteriosclerotic changes are becoming more marked. Gradual closure of the central artery seems to be in process.

Tapeto-retinal degeneration

Dr. Helen Holt said that D. R., a woman aged 29 years, had been presented before this Society in 1939 and 1941 as a case of retinal angiospasm with progressive retinal degeneration. Now the pigmentary changes in the periphery of the retina and the macula with secondary partial optic atrophy, narrowed arteries, and nystagmus, tend to place this case in the category of tapeto-retinal degenerative lesions.

Parinaud's conjunctivitis

Dr. Paulson said that Miguel, aged 11, had a red left eye with tearing, little purulent discharge, and pain. When examined, the conjunctivas of both lids and globe were velvety red and thickened. The cornea was clear. A diagnosis of conjunctivitis was made, and sulfathiazole was prescribed for local use. The smears were negative. Two days later the eye was slightly improved but the bulbar conjunctiva had a mottled yellow-red appearance with swelling more noticeable on the temporal side. Smears and cultures were negative. Two days later, the temporal area was pointing, and the preauricular gland was enlarged. The patient was hos-

pitalized in Cook County Hospital, the pointing area was incised, and cultures made, which proved to be leptothrix. Recovery was complete following the local and systemic use of sulfa drugs.

ALLERGIC KERATITIS AND IRITIS

Mrs. K., aged 30 years, had suffered from recurrent attacks of keratitis and iritis and was seen at the Montgomery Ward Clinic in the spring of 1944, during an acute attack of iritis. She was hospitalized for clinical study and foreign-protein therapy. No focus of infection was found, and no irritant was proved by allergy tests. Elsewhere it was demonstrated that she was sensitive to peanuts, and she realized that indulgence in this food always precipitated attacks. The patient was not seen for more than a year, but has suffered recurrent attacks which have subsided spontaneously. At present, examination shows many faint macular scars in the cornea from attacks of keratitis. More careful allergy studies should be made, and treatment given to prevent further ocular damage.

CHORIORETINITIS

DR. IRVING PUNTENNEY said that Mrs. D., aged 51 years, was examined in 1943, when the vision was found to be 20/50 in the R.E. Recently, there had been a diminution to 20/200. The patient had not been aware of any visual difficulty and had had no illness. On examination, a dense gray film of tissue was found beneath the retinal vessels and above the choroid in an area above the disc, extending around on the temporal side for a distance of 0.5 disc diameter. The macular area was atrophic and granular. No evidence of perivasculitis was noted. The left eye was normal. This patient had previously been treated for syphilis, but for several years tests had been negative. Since this lesion was entirely healed at the time of examination, no further study was made. The similarity of the old lesion to an active one produced by Brucellosis in a private patient examined on the same day prompted presentation of this case. Consideration of Brucellosis as a cause of chorioretinitis should not be overlooked.

R. Von der Heydt.

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EMMA S. BUSS
(1887-1946)

It is with heavy heart that the Journal notes the death of its distinguished and loved manuscript editor, Miss Emma S. Buss. She died quietly in sleep at twilight on August 18, 1946, of cerebral embolism that had swiftly cut her down on the preceding day, in full activity.

Miss Buss came to the Journal as manuscript editor, fully qualified for this meticulous task by a fine training in the preparation of literary and scientific manuscripts. Her knowledge of and interest in the art of written English had great influence upon the literary style of many contributors to the Journal, particularly among the younger authors whose first ventures invariably received her special sympathetic and tactful treatment.

Restricted in her activities by delicate

health and physical handicap, she devoted her life to her religion and to the Journal. These were her two loves and in them she found happiness and satisfaction. The pages of this Journal for the last 15 years reflect her painstaking care and affection. They are the true monument to her memory and tributes to her skill and devotion.

To many she was but a kindly, often uncompromising name. To those who were her coworkers she was a vibrant personality, jealous of the Journal's prestige, a stickler for style, form, balance, and always the right word. Her knowledge of Ophthalmology absorbed from these many years of painstaking work and extensive reading was truly remarkable. One could safely count on her to pounce upon an error in ophthalmic information as well as one in verbal expression.

She looked upon the contributors as her own people and members of the family. She appreciated news of their activities and items of personal interest. She followed their careers with maternal eye, rejoicing in their success and grieving over the lost ones. This is all the more striking because she had met few of them in person. To her they were very real men and women and her friends.

Ophthalmology has lost a staunch champion of great integrity, ophthalmic literature a gentle puritan, and the Journal its right hand. We salute and honor this gracious Christian lady.

Derrick Vail.

OPHTHALMOLOGY IN THE VETERANS' ADMINISTRATION

Almost any magazine that one picks up nowadays is apt to contain an article about the Veterans' Administration. Gratifyingly, the tone of these is changing. Whereas a year or more ago, most of them were condemnatory, the later ones are usually laudatory. This is largely due to the attitude of the new director, Gen. Omar Bradley, and of Gen. Paul R. Hawley in the medical field. The main idea is to give effective service to the veteran without overconsideration for previous rules and regulations. The medical profession was at first very dubious about the whole business, fearing socialization and state medicine, but since the doctors are pretty well satisfied now that this is not in the back of General Hawley's mind and that he is eager for constructive criticism and wants to allow the doctors themselves to have a voice in the planning and in many instances will permit the veteran to choose his own doctor, they have begun to swing into line, praising the efforts of the Veterans' Administration to do a good job.

Let us glance at the overall plans for medical care and then at some details about the ophthalmologic needs and how they are being met.

For administrative purposes the nation has been divided into 13 areas. A supreme consultant has been placed in charge of each branch of medicine, under whom are 13 senior consultants, one in each area. In most areas there are about eight veterans' hospitals—slightly more than 100 in all.

Employment of physicians may be on several different time bases; as, for example, on full time. In the ninth area, the ophthalmologists on this status were also doing otolaryngology when these hospitals were visited in May of this year. The few of these who were employed were mostly young men who were inadequately trained because specialty training has not previously been available to many, owing to the lack of facilities for giving this type of instruction. Also, there are no replacements for those men who wish to take courses elsewhere than at their own posts, as they are now permitted to do. These full-time men are most important

to the hospitals because they are always available and can afford to give unstintingly of their time.

Consultants on part-time—presumably mostly on half-time—service have proved important in the set up. They are usually older than the full-time eye specialists and have more experience. Many are certificated by their Boards and have had considerable surgical training. There are definite drawbacks to this form of service, however, in cases where the responsibility for the conduct of the specialty rests solely on these part-time men. To attract these older men it has been necessary to allow them such salaries that dissatisfaction has been occasioned in the full-time group. Their salaries have approached those of the full-time men, and they have had the further advantage of having half time in which to build and carry on a private practice. Often they have had to perform the functions of full-time men because of lack of the latter. If they are to be employed at all, their function should be primarily as instructors to the young men in the full-time appointments, most of whom will have the status of residents. They should supervise systematic courses of instruction, where basic courses in medical schools are not available, covering most of the phases of ophthalmology as well as giving the help usually expected of a consultant, such as advice and surgical assistance.

A third type of helper is the ophthalmologist retained on a fee basis. This physician functions in either or both of two ways; first, by seeing such patients as are sent to his private office from the regional offices and for which consultations he is paid by the visit (these offices usually represent the veterans' non-hospital centers in the area); or second, by making visits to a veterans' hospital on request.

A recent tour of the veterans' hospitals in the ninth area—Missouri, Kansas, Oklahoma, and Arkansas—gave a picture of all of these methods. In passing, a word might be said commending the foresight of whoever selected the sites of these hospitals and designed the hospitals. Invariably they are located in the highest part of a city or town, in commanding situations with beautiful views. The buildings are, for the most part, modern, well-designed, and well-equipped, although a few are modernized old army-post hospitals. It might also be added that the administrators and chiefs of the medical services give an impression of real interest in their work and of a high grade of efficiency. They seem so keen for the new order that one would have thought that it had originated in the minds of each or at least was just what they had been awaiting through the years. There is, however, some uncertainty as to how much authority each element has in the organization: the dean's committees, the managers, and the branch consultants. The arrangements are all new, and these matters will have to be worked out gradually.

But to return to the methods of employment, in only two of the eight hospitals was there a full-time ophthalmologist and otolaryngologist, and in none a full-time ophthalmologist. Everywhere the former at least was badly needed. This man should be the one doing the major part of the ophthalmology. Instead, his work was usually being done less effectively by one or more consultants whose visits to the hospitals were often intermittent, somewhat casual, and sometimes at the convenience of the consultant rather than at that of the hospital.

Primarily, this would seem to be because the young men who would be desirable for the full-time service have not been interested. One may ask why this is so. In the first place the Veterans' Ad-

ministration has been disparaged by physicians and laymen. One of the most important services that the many new consultants can do for the Veterans' Administration is to talk it "up," not "down." Broadcast the good name that it now deserves, and also, of course, make it a better place for training young men.

This introduces the next point: training. The young man wants to go into a residency where he will get good instruction, a residency so good that it will be accepted for training by the American Boards. Can the Veterans' Administration put on this kind of a program for its young men? In certain of the hospitals this might be done in the following manner. In the first place veterans' hospitals wherever possible should be closely integrated with medical schools. Where graduate training is already being given in these schools, arrangements could be made for the veterans' hospital residents to attend the lectures. Where such programs have not been set up, it might be possible to conduct correspondence courses from medical schools in the area, utilizing the local consultants as advisers in these courses. A stimulating addition to this would be to permit the young residents occasionally to attend one of the recognized basic courses for a week or so at a time. Some of the organizations giving basic training have scheduled their lectures so that they could be handled in this manner. In those areas where no such courses are given, the correspondence courses of the American Academy of Ophthalmology and Otolaryngology might be utilized. The coöperation of the consultants in a teaching capacity is a *sine qua non* for the successful accomplishment of this project.

If some such plans as this, which might lead to complete training for Board examinations, were offered as an attraction, it is likely that there would not be too great difficulty in signing up residents. But this should be done at once while there are so many veterans seeking specialty training. Since the salaries of veterans' hospital medical personnel are automatically raised 25 percent upon their obtaining certificates of their Boards, it is probable that this would serve as an inducement for them to take permanent positions with the Veterans' Administration.

Lawrence T. Post.

THE ASSOCIATION FOR RESEARCH IN OPHTHALMOLOGY

The fifteenth scientific meeting of the Association for Research in Ophthalmology was held in the Hotel Mark Hopkins Tuesday, July 2d. Eight papers on experimental ophthalmology were presented on subjects varying from experimental dinitrophenol cataract to observations on the aqueous veins. The meeting was well attended and constituted a valuable supplement to the programs of the American Ophthalmological Society which preceded it and of the Section on Ophthalmology of the American Medical Association which followed it.

In its 15 years of existence the Association has proved to be a very valuable outlet for ophthalmological research of the more basic type and has brought to the attention of the clinical ophthalmologist many basic studies which might otherwise, in large part at least, have been lost to him in the basic science journals. The Association has drawn together the clinical ophthalmologists especially interested in basic research and the not inconsiderable number of basic science investigators attached to the various university eye departments throughout the country.

In their meeting this year the trustees of the Association decided to take steps which would enable the Association to

function in this direction even more extensively than in the past. It was felt that the Association should be the main meeting ground for the clinical ophthalmologist and the basic science workers engaged with eye problems, including those *not* attached to eye departments. It was pointed out that there are a surprising number of studies of eye interest being performed by anatomists, physiologists, biochemists, microbiologists, geneticists, and other workers in the basic sciences which in general only reach ophthalmologists indirectly in the form of cursory reviews in the abstract sections of our journals.

To encourage these workers to present their papers to the Association, steps were taken to broaden the membership by reducing the membership fees of full-time research workers in the basic sciences and by arranging for the appointment of an increasing number of outstanding basic-science workers to the offices of the Association. It was agreed further that the Association should create a research medal, comparable to the Howe Medal of the American Ophthalmological Society, to be awarded for basic studies of special value. With a view to increasing the availability of basic studies of eye significance to ophthalmologists in general, a committee was appointed to investigate the possibility of developing special basic-science supplements to the established journals to contain comprehensive abstracts or complete articles. The committee is even to consider the eventual publication of an independent journal of investigative ophthalmology.

In a broad sense there are two types of basic research in ophthalmology. The first may be termed original research and is the type requiring the rarer talent. The second type, also of great value, consists in the application to special eye problems of the tremendous amount of original basic research done by investigators in the various basic fields. This may be compared with the work of the industrial scientist who makes practical application of the discoveries of the pure research worker to special industrial problems. Progress in ophthalmology, as in other specialties, must follow, in large part at least, the progress of basic scientific research, and a primary purpose of the Association for Research is to foster such research and to bring its results to bear as fully as possible on the problems of ophthalmology. It is a great credit to the profession that so many ophthalmologists have recognized the importance of this relationship and that the founders of this Association had the vision to organize a society to promote it.

Phillips Thygeson

RETURN LEND-LEASE

At the close of one of the San Francisco meetings, the members were still delighting in the felicitous remarks of a distinguished British guest. This was not alone for the gracious and easy phrasing, but even more by reason of the precise and interesting choice of words. Perhaps no one realized that singling out this speech was no compliment to the other speakers on the program. This is not the first time that the superior flavor of English medical papers has been noticed.

Very likely this is only another evidence of American adolescence but the time is not too distant when we should be outgrowing our more glaring faults of style, either slovenly, on the one hand, or pretentious on the other. At the same session someone privately criticized the repeated references to "recti muscles." This queer barbarism seems to have caught the fancy of a number of recent speakers. This may be simply struggling

for elegance, or it may be that these authors are overcome by the knowledge that however disagreeable the Romans themselves may have been, they saw to it that their adjectives conformed in number and case to the antecedent nouns. At any rate, some men who would never have been caught saying "obliques muscles" go all out for pluralizing "rectus." So it was "recti muscles," as we say in the Latin.

This is nothing, though, to the French influence. By it Professor Barraquer is deprived of the final "r" of the Spanish, and is Gallicized to "Bar-ra-kay." H. M. Traquar ceases to be Scotch and becomes "Tra-care." Even when the Greeks had a perfectly good word we still have to show off our French. Ophthalmic residents who would never be guilty of pronouncing "shemosis" for chemosis, speak glibly of "shalazion" meaning chalazion. Yet when we could follow the French to advantage, we have to use the Greek derivative to our everlasting sorrow. In the dear dead days you had your eyes examined by an oculist. This was standard procedure. The public was familiar with the word ocular as an adjective, and as the eyepiece of an optical instrument. So there was no uncertainty as to the occupation of an oculist. Today we are ophthalmologists, but what layman knows what ophthalmologist means? This is beside the point in discussing diction, but just how long did it take your secretary to learn to spell the name of your occupation correctly—if she can do it now? Years ago, when oculists were beginning to go out of circulation, one of the journals carried a long paper advocating instead, the use of "ophthalmologist." Uniformity, it said, demands it. Well, we have achieved uniformity. We stand on the same rarefied plane as the otologists and the rhinologists, names which carry no glimmer of significance to the public. To be sure we might have dropped to the level of the pediatrists, who are popularly confused with corn-doctors. "I know that opto-MEET-rists fit eyes, but what," asked a lovely blonde thing, "is an ophthal-MO-gist?"

This brings up a little clean fun enjoyed by one of the elder statesmen, at the expense of ophthalmologists who use the optometric term "duction," for convergence and divergence. A much neater trick of our lay confreres has been to foist upon us the abuse of "pathology." This is not in the proper abstract sense of the science, or study, but to signify the concrete lesion. "There is no pathology," they say, meaning that no abnormality is noted. Why not say there is no ophthalmology and have done with it. Pathology sounds more rococo, which is reason enough for avoiding it.

If the mischief worked by the radio were to be discussed, there would be no end to this plaint. It would be a comfort, though, to go to just one meeting without hearing someone say "different than" when meaning "different from," or having the ears assailed by the penultimate accentuation, "posi-TIVE-ly" and "evi-DENT-ly" after the jargon of the announcers.

How about going British enough to act as though we had had an ordinary grammar school education?

They have several things over there to contribute besides island bases.

S. Judd Beach.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

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CORNEA AND SCLERA

Pillat, A. **The incidence of epidemic keratoconjunctivitis in Styria.** Klin. M. f. Augenh., 1943, v. 109, May-June, p. 289.

Pillat reports his observation in 160 cases of epidemic keratoconjunctivitis observed in the University Eye Hospital at Graz during the severe epidemic of 1942. The highest peak was reached in February and a minor elevation in June. In 40 percent of the cases the conjunctiva alone was affected and in 60 percent both conjunctiva and cornea. The diagnosis may be questioned when the process is confined to the conjunctiva, since the disease may be confounded with other diseases such as trachoma, follicular conjunctivitis, and even tularemia. As a matter of fact 27 of the 160 patients had suffered from various eye diseases before the outbreak of the keratoconjunctivitis. In 13 patients trauma had preceded the onset of the inflammation, and in 10 of these a surgical operation. Temporary loss of vision up to 5/36 was observed in 20 patients, but all regained normal or approximately normal vision after a few weeks. The majority of cases occurred in the young and the middle-aged and predominantly in the urban population. In the postoperative inflammations the infection started at least six to ten days after the operation was performed, and it must be assumed that it was transmitted from one patient to another by doctors, nurses, or dressing material. Acquisition of immunity after healing of the disease is probable. There were no definite recurrences. Experimental inoculation of animal (rabbit and guinea pig) eyes failed. Bacteriologic examinations revealed no pathogenic bacteria. Therapeutically it is important to avoid all kinds of dressings in all stages of the disease. Local treatment consisted of instillations of 3 to 5-percent targesin or 3-percent boric acid solution. Sterile horse serum or liquid paraffin instilled hourly were also beneficial. Pillat does not believe that a 1-percent solution of optochin is as specific as has been claimed. Heat is indicated when the cornea is in-

volved. Pillat has the impression that sulfa drugs in large doses contributed to a more rapid disappearance of the irritation of the cornea as well as of the conjunctiva. He is definitely opposed to the practice of considering the three most common superficial corneal diseases (allergic, superficial, punctate keratitis, epidemic keratoconjunctivitis, and keratoconjunctivitis nummularis) as one. They should be differentiated until the etiologic factors are known. (1 map, 3 charts, 4 corneal pictures, references.) F. Nelson.

Sydenstricker, V. P., Hall, W. K., Hock, C. W., Pund, E. R. **Amino acid and protein deficiencies as causes of corneal vascularization: a preliminary report.** Science, 1946, v. 103, Feb. 15, pp. 194-196.

In May, 1945, a biomicroscopic examination was made of more than 200 inhabitants of Leiden, The Netherlands, who were selected at random from the population. Ten percent were suffering from famine edema. None of the individuals examined showed corneal vessels. In the rat corneal vascularization develops when there is a deficiency of any of three indispensable amino acids or of protein. Further investigation is necessary before the significance of these findings becomes clear. (References.)

Melchiore Lombardo.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Beauvieux, J., and Bessière, E. **Sympathetic ophthalmia. Its place in general pathology.** Presse Médicale, 1945, no. 44, Nov. 3, p. 593.

The various theories as to the etiology of sympathetic ophthalmia are reviewed. The authors conclude that the disease must be an infection and note that several clinical observations point to the bloodstream as the source. They report a case of the disease in a man, 61 years of age, who suffered a perforating injury of the left eye which necessitated enucleation 35 days later because of impending sympathetic inflammation of the right eye. With the first signs of irritation in the sympathizing eye the patient noted severe frontal and occipital headaches, partial deafness and humming noises, and evening temperature elevations. Spinal fluid studies showed 543 lymphocytes per cubic millimeter. Treatment consisted of intravenous injections of sodium salicylate and intramuscular injection of electrargol, followed later by a course of penicillin, 630,000 units in eight days. Under treatment the temperature became normal, the headaches and deafness disappeared, and the inflammation of the eye subsided somewhat, although vision had dropped to 0/2. Ophthalmoscopic examination revealed a retinal detachment in the extreme periphery in the lower quadrant of each eye but this subsided spontaneously. Three months after the injury, however, the spinal fluid still showed 400 lymphocytes per cubic millimeter.

The resemblance of this case to Harada's disease and to the Vogt-Koyanagi syndrome was striking and the authors conclude that the symptomatic triad of bilateral uveitis, lymphocytic meningitis, and neurologic difficulties belong not only to sympathetic ophthalmia but to other syndromes. They do not believe that this indicates a common etiology but rather that it suggests that different viruses may have similar tissue affinities.

Phillips Thygeson.

Bessiere, E., and Corcelle, L. **Uveomeningitis and Harada's disease.** Arch. d'Opht., 1945, v. 5, no. 3, p. 344.

The authors add two new observations to the literature on the syndrome of bilateral uveitis with meningitic or cerebral manifestations. Neither patient, however, had auditory difficulties, retinal detachment, or pigmentary disturbances of the skin or hair such as are customarily found in Harada's disease. They discuss the nature of this type of uveitis and conclude that Harada's disease is truly a clinical entity but that it is not correct to consider all cases of uveitis with meningeal symptoms as incomplete forms of it. They point out that many of the neurotropic viruses, for example, the herpes zoster virus, may affect both the uveal tract and the central nervous system.

Phillips Thygeson.

Brues, A. M. **A genetic analysis of human eye color.** Am. J. Phys. Anthropol., 1946, v. 4, March, p. 1.

Comparisons of siblings provide a better basis for studies in human genetics than analyses of successive generations, since the latter method is limited and often dependent on indirect evidence. This paper demonstrates the methodology of sibling comparison studies, as applied to the analysis of human eye color.

Three hundred subjects were examined. Ten color groups were arbitrarily set up, as well as groupings for secondary iris markings. In all, there were 50 possible color combinations, reduced for simplicity to eight eye color types. To this color analysis, there was added the additional variable of iris structure, for which purpose iris patterns were grouped as: smooth or smooth-striated, cryptose, ridged, eroded or scalloped.

The varieties of eye color, with the criteria of iris structure, could be explained, from this study, by six factors:

1. The first factor, a dominant, was a determinant of heavy, dark irides (smooth, brown).

2. The second factor determined differences between dark smooth and brown-mixed smooth irides.

3. The third was the sex-linked "dark" factor. In this connection it was observed that there was a predominance of darker eyes in women.

4. A sex-linked dominant factor was responsible for the antenatal or neonatal vessel atrophy which produced the "scalloped" or "ridged" iris. In the absence of this factor, the irides appeared "cryptose" or "eroded."

5. A fifth factor was that which rendered the pigmented areas, in a "mixed" eye brown, rather than yellow.

6. A recessive factor responsible for the infrequent truly dark eyes without smooth structure.

The importance of iris structure in relation to color inheritance complicates any attempt to systematize the data in this study, and demonstrates the impracticability of attempting to predict eye color in offspring, or to trace parentage through evaluation of eye color. The only practical value of the study may be in the possibility of predicting, on the basis of dominant sex-linked iris traits, whether normal females are carriers of sex-linked defects known to exist in their families.

Benjamin Milder.

Buckler, C. W. **Seesaw nystagmus associated with choroiditis and positive neutralization test for toxoplasma.** Arch. of Ophth., 1946, v. 35, March, pp. 301-302. (See Section 4, Ocular movements.)

Essen-Möller, Lars. **Pulmonary findings in chronic and acute iridocyclitis and choroiditis.** Acta Ophth., 1942, v. 20, pt. 2, pp. 97-120.

The data are based on pulmonary X-ray findings in 186 cases of chronic iridocyclitis, 140 cases of acute iridocyclitis, 62 cases of sclero-keratitis, and 44 cases of choroiditis. The chest X-ray films of 96 patients hospitalized because of accidents, 325 psychiatric patients, and 21 patients with eye diseases that have no relation to tuberculosis were used as a control. A comparative analysis of the pulmonary findings in the two groups reveals the following facts.

In chronic iridocyclitis active pulmonary processes, mostly at the hilus, were found in about half of the patients, or 10 percent more frequently than in the control group. The pulmonary changes were found chiefly in iridocyclitis with iris nodules and fatty precipitates, findings that clinically suggest tuberculosis or Boeck's sarcoid. The active hilus processes were also apparently of the same origin and could be considered a source of hematogenous infection. There was no greater frequency of active foci or healed scars in the lungs of patients with diseased eyes than in those of the control group.

The frequency of pulmonary lesions, active or healed, in acute iridocyclitis was not greater than in the control group. Clinically, the ocular disease was attributed to rheumatism, gonorrhea, and acute infections.

In sclerokeratitis pulmonary lesions were found with the same frequency as in chronic iridocyclitis; there were scars in the lungs, presumably of tuberculous origin. There was no case of Boeck's sarcoid in this group, and hilus adenitis was found once. The pulmonary lesions are apparently of a different type from those found in iridocyclitis, and suggest a different pathogenesis. It is particularly interesting that in choroiditis the pulmonary lesions did not exceed those of the control group; hilus adenitis was not found in any of these. Choroiditis is generally believed to be tuberculous, and the lesions in the fundus are believed to be the invasion sites of tubercle bacilli. The data of this study indicate that the relation between choroiditis and tuberculosis needs further investigation.

It is pointed out that the determination of the etiology of the ocular lesions on the basis of pulmonary X-ray findings is not reliable. The tonsils and the cervical and mediastinal glands should be considered as sources of a tuberculous infection.. There is also the possibility that pathologic hilus glands and active processes in calcified glands may escape roentgenologic demonstration. Ray K. Daily.

Essen-Möller, Lars. **The prognosis of chronic iridocyclitis.** Acta Ophth., 1942, v. 20, pt. 2. pp. 121-144.

A detailed analysis of 244 case histories of chronic iridocyclitis revealed that the data were adequate for this study in 86 percent. Seventy-two percent of the patients recovered, and in 42 percent the vision was normal. Forty-two percent had a visual acuity of less than 0.3 and 30 percent were practically blind. Vocational disability between 80 and 100 percent occurred in 20 percent of the patients. The prognosis for recovery and for visual acuity is worse in bilateral lesions. In patients over 40 years of age, the prognosis is poorer for women than for men; in younger patients it is the same in women and men. A rise in ocular ten-

sion occurred in one third of the eyes. A moderate rise of short duration does not affect the prognosis. With a marked and prolonged rise of tension, the prognosis is worse, particularly when surgical intervention becomes necessary.

When pulmonary changes are demonstrable roentgenoscopically the prognosis of the ocular lesion is worse than in patients with normal lungs. The clinical course of the ocular lesion was no different in patients with healed pulmonary lesions than in those with active processes. When there were active lung lesions, the ocular involvement was more frequently bilateral.

Ray K. Daily.

Gonzales-Pola, A. M. **The physiopathology of the intraocular circulation.** Arch. de la Soc. Oft. Hisp.-Amer., 1945, v. 5, Feb., pp. 79-91.

The autonomic-endocrine imbalance and its relation to the uveo-retinal circulation is briefly discussed. With the development of ophthalmoscopy in red light and retino-photography in infrared light the choroidal circulation, formerly inaccessible for study, will became better understood, and many of the pathologic processes grouped under the common name of choroiditis will be found to be the results of vascular disturbances. The occurrence of choroidal lesions at puberty and at the menopause indicates that the endocrine glands play an important role in their pathogenesis. The organic lesions are secondary to functional disturbances. Because of the abundant blood vessels of the choroid circulatory disturbances do not cause a necrosis of tissue. The primary disturbance is a slowing of the blood stream due to a lack of vascular tone and defective contractility of the vessel wall. The parasympathetic function is diminished with an excess of sympathetic dominance; this leads to vascular spasms, an increased pH, and diminished oxygen content; the latter stimulates the vasodilators and an irregular alternation of vaso-constriction and vaso-dilatation sets in which impairs the function of the choroidal vessels and retinal nutrition. Localized disturbances of this nature result in the development of the choroidal foci, which were formerly considered inflammatory.

The therapeutic difficulties are due to the fact that the drugs that affect the general blood pressure have no effect on the retinal vessels, unless administered inträarterially. Whatever effect on the eye may be obtained through the general administration of mimetic drugs can be fortified by the local use of such drugs in the eye.

Ray K. Daily.

Jebejian, R. and Kalfayan, B. **The oculo-bucco-genital syndrome.** Ann. d'Ocul., 1945, v. 178, Aug., pp. 335-344.

Fifteen cases of this syndrome (Behcet) have been reported. There may be recurrent iritis in both eyes and retinal inflammation with hemorrhages and retinitis proliferans. In the lips and mouth recurrent ulcers of the herpetic type occur, and the genital lesions are recurrent ulcers in scrotum and vulva. Erythema nodosum and joint inflammations are less frequent. There is rarely any loss of the general well-being of the patient. Both sexes and practically all ages may be affected. Involvement of the different bodily parts may be mild or severe, complete or incomplete, simultaneous or at intervals. In the author's case, a transient recurrent macular edema in both eyes was first observed in a mechanic, 19 years of age, and apparently in good health.

This was followed by a bilateral iritis with hypopyon, and later by retinal hemorrhages, retinitis proliferans, and ulcers in the lips, mouth, and scrotum. All relevant serological tests were negative. A biopsy from the lip revealed acid fast bacilli resembling those of bovine tuberculosis. In the course of five years the vision of one eye was lost completely because of secondary glaucoma and atrophy. The vision of the other eye was 8/200. This syndrome apparently is a basic constitutional degeneration of definite tissues in several parts of the body, that makes them allergic or reduces their resistance to the organisms or toxins of several bacteria or viruses. (6 figures. 20 references.) Chas. A. Bahn.

Kinsey, V. E., Jackson, B., and Terry, T. L. **Development of secretory function of ciliary body in the rabbit eye.** Arch. of Ophth., 1945, v. 34, Nov.-Dec., pp. 415-417.

As one approach to the problem of the causation of ocular maldevelopment in premature infants, a study was made to determine when the intraocular fluid assumes its adult character of a secretion. The ascorbic acid content of the aqueous humor and blood were measured in rabbits from birth until the age of 32 days. The concentration in the aqueous was found to increase rapidly after the ninth day, reaching the adult level 18 days later. The ascorbic acid concentration of the blood remained essentially constant. The concentration of ascorbic acid in guinea pigs at birth did not differ significantly from that in the adult animals.

The volume of the aqueous and the volume of the eye increased linearly with age from birth. The ratio of the volume of aqueous to the volume of the whole eye increased rapidly from birth to reach a constant value at the same time (27 days of age) that the ascorbic acid concentration reached a maximum. John C. Long.

Måhlén, Sven. **A contribution to the knowledge of flocculi iridis.** Acta Ophth., 1942, v. 20, pt. 2, pp. 153-158.

The literature is reviewed in detail and a case in a 15-year-old boy is reported. There was no relevant family history and his visual acuity was normal. His pupillary borders were surrounded by small brown grape-like bodies, some of which were vesicular. Homatropine produced only moderate mydriasis because the flocculi presented a mechanical obstruction to dilatation. (2 illustrations.)

Ray K. Daily.

Porsaa, Kaj. **Papilloedema in iridocyclitis.** Acta Ophth., 1944, v. 21, pt. 4, pp. 316-329. (See Section 11, Optic nerve and toxic amblyopias.)

Rasmussen, Knud. **Pathologico-anatomic investigation of iritis Boeck.** Acta Ophth., 1943, v. 21, pt. 3, p. 214-223.

The enucleated eye of a girl, 12 years of age, presented a microscopic picture of chronic iridocyclitis, that involved principally the ciliary body. The large mass of tissue that adhered to the ciliary body and extended to the lens and choroid consisted of connective tissue with round-cell infiltration, interspersed with larger and smaller conglomerates of typical epithelioid tissue. The literature is reviewed, and it is reaffirmed that clinically and histologically Boeck's uveitis is a special ocular manifestation of a general affection, and not an incidental occurrence of uve-

itis in a patient suffering from Boeck's sarcoid. (4 illustrations.)

Ray K. Daily.

Rauh, Walter. **The photographic picture of choroiditis centralis serosa.** Klin. M. f. Augenh., 1943, v. 109, March-April, p. 152.

Central serous choroiditis, apparently common in Japan, was thought to be rare in Germany until Meisner pointed out in 1942 that it occurs more commonly than had been assumed. Rauh reports two cases, one of which occurred in a woman, 37 years of age, and the other in a man, 38 years of age. He was able to follow up the increase and decrease of the edematous disc in the macular region and the formation of pigmentation and choroidal foci near the posterior pole with serial fundus photographs. In both cases the characteristic sharp limitations of the edema, the small grayish-yellow spots in the lesion, the development of a choroidal lesion, a slight recurrence, and eventually the total disappearance of the edema could be demonstrated photographically. (13 fundus photographs, references.) F. Nelson.

Rogge, A. J. **A case of sympathetic heterochromia acquired in adult age.** Acta Ophth., 1942, v. 20, pt. 2, pp. 205-211.

A woman, 49 years of age, developed myosis in the left eye, narrowing of the palpebral fissure, and a partial depigmentation of the iris, which had been normally pigmented. The pupil was displaced slightly nasally. General examination was negative, except for a paralysis of the sympathetic on the left side. The father of the patient had blue and the mother brown eyes. It is believed that this patient had a latent hereditary predisposition to heterochromia due to incomplete crossing of the hereditary traits from the parents, which became active after paralysis of the sympathetic. The cause of the sympathetic paralysis could not be determined. Ray K. Daily.

8

GLAUCOMA AND OCULAR TENSION

Bailliart, P. **Some errors in ophthalmic practice: glaucoma.** Ann. d'Ocul., 1945, v. 178, June, pp. 254-257.

The need for frequent changes of glasses in those past 50 years of age, a transient or permanent change in visual acuity, and pain in and about the eyes without objective explanation should suggest tonometry and field measurements. Clinical glaucoma with practically normal tension is easily overlooked. Pilocarpine should be used routinely after tonometric measurements in glaucomatous patients. Tonometric measurements alone are not sufficient to determine the progress of glaucoma; the vision and visual fields are just as important. Paracentral scotomas are easily overlooked. Patients who have glaucoma should be informed that their sight is worse in dull light, and that they should avoid it as far as possible. The progress of glaucoma depends partly upon general well-being, and the patient should avoid caffeine as well as physical and mental excitement and exhaustion. Glaucomatous patients whose tension is not completely under control should be examined at intervals of not more than 15 days. Glaucoma is frequently controlled by miotics but seldom cured, and one must continue the use of miotics even when the tension is under control. When operation becomes nec-

essary because miotics no longer control the tension it should be performed promptly. Orbital alcohol injections do not replace operation. Paracentesis should be avoided in primary glaucoma. Paracentral scotoma may become central after operation. Normal tension after fistulizing operations does not necessarily insure the retention of vision throughout life. After glaucoma operations general health and well-being should be maintained at its maximum. Chas. A. Bahn.

Coppez, Leon. **The pyrometric electrode in Vogt's glaucoma operation.** Ophthalmologica, 1945, v. 109, Feb.-March, pp. 80-101.

It is not enough to know the strength of the current in diathermy. The factor of greatest importance is the temperature that is produced in the tissue. This can be measured by means of the pyrometric electrodes that the author described several years ago. Tissue damage can only be avoided if the temperature is carefully measured and is known throughout the procedure. The author discusses the physical basis of the method of temperature control in great detail and describes his method of surgical operation. The latter is a modification of Vogt's diathermy puncture; a flat electrode is placed directly on the denuded sclera over the flat part of the ciliary body.

Alice R. Deutsch.

Icaza, M. J. **Medical treatment of acute glaucoma.** Arch. of Ophth., 1946, v. 35, April, pp. 361-365.

As an aid to the treatment of acute glaucoma the author uses a retrobulbar injection of one cc. of a 2-percent procaine hydrochloride solution to which 0.0001 gm. of epinephrine hydrochloride has been added. Pilocarpine and physiostigmine are instilled into the eye before and after the retrobulbar injection. This treatment is followed by prompt loss of pain and congestion and the eye becomes soft. Eyes so treated can be operated upon days or weeks later under perfect conditions of tension for the operation, and the patient will not have suffered a recurrence of pain in the meantime. John C. Long.

Jayle, G. E., and Schachter, M. **Hypophysis and glaucoma. Statistical study of the characteristics of the arterial pressure in glaucoma.** Presse Medicale, 1946, No. 4, Jan. 26, p. 51.

The authors discuss the role of the endocrine glands, in particular the hypophysis, in glaucoma and mention the decrease in intraocular pressure which accompanies the physiologic hyperpituitarism of pregnancy. They note that glaucoma almost never occurs during pregnancy and that hypotension is a feature of acromegaly, chromophobic pituitary adenoma, and the syndrome of Babinski-Froelich. In contrast they note the permanent or recurring attacks of ocular hypertension and rise in blood pressure in Cushing's syndrome. They note that in Simmond's disease there is marked arterial hypotension where there is marked hypofunction of the gland. They make a statistical comparison of the arterial pressures in 45 cases of chronic glaucoma and compare them with the pressures in Simmond's disease and Cushing's syndrome. They found hypertension in 75 percent of the patients with glaucoma, in 87 percent of those who had Cushing's syndrome, and in two percent of those with Simmond's disease. They note the importance of age in glaucoma and its

lesser importance in the two pituitary syndromes but conclude that the findings point to a possible pituitary role in the production of chronic glaucoma.

Phillips Thygeson.

Law, F. W. **Glaucoma.** Guy's Hospital Gazette, 1946, v. 60, March 16, p. 66.

In this lecture, the author stresses the anatomical factors in the etiology of the various forms of glaucoma. In each instance he refers the ultimate cause to narrowing or obliteration of the chamber angle. Secondary glaucoma is considered briefly, and mention is made of the manner in which such diseases as iridocyclitis, hyphema, subluxation of the lens, and intraocular masses produce glaucoma by their effect upon the chamber angle.

Primary glaucoma is described under the headings of congenital, chronic simple, acute and chronic subacute. The author differentiates between chronic simple glaucoma, which he describes as entirely symptomless, and chronic subacute glaucoma, characterized by symptoms generally described in textbooks under the heading of chronic simple glaucoma.

The treatment of secondary glaucoma must be directed toward the causative factor. In the acute primary type medical treatment should be applied for one or two days before resorting to surgery. Chronic glaucoma should be treated as acute during attacks, using miotics, heat, morphine and dehydration. The aim of all surgery in primary glaucoma is to provide a new area of drainage for the aqueous.

Benjamin Milder.

McPherson, S. D. Jr. **Cyclodialysis in the treatment of glaucoma.** Amer. Jour. Ophth., 1946, v. 29, July, pp. 848-853. (6 tables, references.)

Rednót, Magda. **The origin of hypotony of the eye. Ocular findings in orthostatic hypotony.** Klin. M. f. Augenh., 1943, v. 109, March-April, p. 161.

The term orthostatic hypotony was coined in 1932 by Laubry and Doumier. Formerly the symptom complex was called postural hypotension by Bradburg and Eggleston in 1925. The most pronounced symptoms of the disease are vertigo and unconsciousness accompanied by a rapid decrease of the systolic and diastolic blood pressure as well as increase of pulse rate in the upright position. These patients perspire only slightly if at all. Secretion of urine is increased during the night, when the body is in a horizontal position. The basal metabolic rate is somewhat subnormal. Disturbances of the organs of internal secretion are common. One case of typical orthostatic hypotony in which the author was able to observe a number of interesting ocular symptoms is reported. A man, 57 years of age, had functional disturbances of the hypophysis, but no Addison's disease, tabes dorsalis or other neurological ailments. He was admitted to the hospital because of severe vertigo. He had convergent strabismus with normal vision in the right eye and amblyopia in the left. In the horizontal position the ocular tension was 17 mm. Hg and was not influenced by mydriatics. After several up and down movements of the body it went up temporarily to 22. In the sitting position the tension dropped to six, and the patient complained of vertigo. When the patient stood up tension fell below four mm. Hg, and he lost consciousness. The fundus was pale and pulsation of the retinal arteries was visible. The blood pressure was reduced to 60 mm. Hg. The variation of the ocular tension is a new symptom of

orthostatic hypotony. Its decrease is caused by the fall of the blood pressure, a sign of disturbance of the peripheral sympathetic system. The retinal blood pressure was measured with Baillard's and Kukán's dynamometer. Variations in ocular and vascular tension follow parallel courses as in some cases of neurasthenia, poisoning with chloral hydrate, typhoid fever, and particularly in the comatous stage of diabetes. (References.) F. Nelson.

Riddell, W. J. B. **Tangential displacement of the iris in chronic glaucoma.** Brit. Jour. Ophth., 1946. v. 30, Feb., pp. 74-81.

The author describes a tangential displacement of the radial fibers of the iris in chronic glaucoma. It is certainly a stage in the atrophy of the iris in advanced glaucoma but it can occur early. He briefly describes its appearance in 14 of 35 consecutive cases of glaucoma. Morris Kaplan.

Smith, J. H. **The blood-aqueous barrier in hydrophthalmic rabbits.** Ophthalmologica, 1944, v. 108, Dec., pp. 293-297.

The university eye clinic in Basel successfully bred a strain of hydrophthalmic rabbits with greatly increased ocular tension. A solution of fluorescein sodium was injected subcutaneously into such rabbits as well as into normal rabbits. It was found that the fluorescein appeared later in the aqueous of the hydrophthalmic rabbits and that its flow across the blood-aqueous barrier is, considerably slower than in the eyes of normal rabbits. (References.) Max Hirschfelder.

Weekers, L., and Weekers, R. **The hypotensive effect of diathermy on the ciliary body without perforation of the sclera.** Ophthalmologica, 1945, v. 109, April-May, pp. 212-226.

The authors describe a modification of Vogt's diathermy-puncture which they call nonperforating cyclodiathermy. They discuss the technique of this operation, its effect on the intraocular tension, its influence on the visual acuity and fields, its possible postoperative complications, as well as its advantages as the operation of choice in chronic, secondary, and absolute glaucoma.

They use the ophthalmic diathermy apparatus on a bipolar current. The active electrode consists of a small cylinder .75 millimeter in diameter and one millimeter long which is fitted to a curved metal arm to control the isolation and limit the penetration. They instill a local anesthetic and prolong anesthesia by retrobulbar injection and warn against the use of subconjunctival injections because of the chemosis which follows. The electrode is applied directly to the eyeball without dissecting the conjunctiva. Pressure is necessary to maintain contact. Eight applications are made seven millimeters from the limbus, in regular intervals so spaced as to avoid the insertions of the ocular muscles. The time of application is 15 seconds. The operation is effective in chronic glaucoma because it produces permanent increase in the lumen of the uveal vessels which results in increased resorption of the intraocular fluid. Usually some atrophy of the ciliary body develops which is also a factor in reducing tension because less aqueous is produced. The operation is indicated in both secondary and absolute glaucoma. Alice R. Deutsch.

Weekers, Roger. **A contribution to the study of incomplete glaucoma.** Oph-

thalmologica, 1943, v. 105, June, pp. 307-317.

If one or the other of the classical symptoms of glaucoma is missing, so called incomplete glaucoma is the result. The monosymptomatic glaucoma which manifests normal tension, normal fields but a distinct pathological cupping is the special study of this paper.

The author observed eight patients affected with this disease. The first patient had the monosymptomatic glaucomatous cupping in one eye only without any other change. Two patients had the same disease in both eyes. Two others had the monosymptomatic glaucomatous cupping in both eyes and an enlargement of the blind spot in one eye. Two others had nerve-fibre scotomas and nasal contraction of the fields with a glaucomatous cupping. The last patient was especially interesting. He had an absolute glaucoma in one eye and a typical monosymptomatic cupping in the other.

This small list of case histories shows the intermediary stages between the monosymptomatic cupping without ocular hypertension and the typical chronic glaucoma with ocular hypertension, field restrictions and visual loss to complete blindness. (6 fields, 1 table, references.)

Alice R. Deutsch.

Westerlund, E. **The heredity of congenital hydrophthalmos.** Acta Ophth., 1944, v. 21, pt. 4, pp. 330-348.

The material is gathered from the records of the Institution for the Blind in Copenhagen, during the period 1881-1942. The total number of children with buphthalmos was 97; in 23 of them it was familial. A detailed analysis of these cases indicates that the mode of heredity in buphthalmos is recessive. It thus appears that this form of glaucoma differs genotypically from juvenile and senile glaucoma, which are dominant. The data also reveal that in siblings the course and final outcome of the disease bear the stamp of a familial peculiarity.

Ray K. Daily.

9

CRYSTALLINE LENS

Atkinson, W. S. **Corneal section with long bevel and conjunctival flap for cataract extraction.** Arch. of Ophth., 1946, v. 35, April, pp. 335-345.

The author advocates corneal incision with a long bevel and a conjunctival flap made by keratome and scissors. The long bevel combined with McLean sutures prevents a leaky wound with shallow anterior chamber and also prevents prolapse of the iris. The location in the avascular cornea decreases the incidence of postoperative hemorrhage. The technique of the operation is described in detail. The corneal shelf makes it necessary to deliver the lens by tumbling. Three hundred cases of cataract extraction are reported, divided into groups of 100 each. The last 100 operations were performed according to the technique described. The case reports indicate that the long-beveled corneal section results in superior visual acuity and fewer complications. John C. Long.

Bracken, F. **Complications incident to simple intracapsular extraction.** Arch. of Ophth., 1945, v. 34, Nov.-Dec., pp. 427-430.

Well placed sutures are the best defense against complications with the simple intracapsular operation. The author uses a corneoscleral mattress suture centrally and at least one addi-

tional corneoscleral suture on each side. Rupture of the hyaloid or prolapse of vitreous necessitates a complete iridectomy. Prolapse of the iris is treated as early as possible, either by excision or by replacement and the use of additional sutures. Since he uses corneoscleral sutures the author has found an empty chamber on the morning after surgery in only 0.28 percent of his patients. The technique of delivering the lens is discussed. John C. Long.

Bracken, F. **Instruments for use in operation for cataract.** Arch. of Ophth., 1945, v. 34, Nov.-Dec., pp. 430-431.

An anterior chamber irrigator shaped like an iris repositor and attached to a rubber bulb is described. A sharp heavy globe fixation forceps is illustrated. A corneoscleral suture forceps not unlike a miniature Elschnig forceps is described. This forceps has round, needle-sharp teeth and is used to grasp the edge of the cornea or the episclera without pressing on the globe. (3 photographs.) John C. Long.

Broendstrup, Poul. **The function of the retinal periphery in uncorrected unilateral aphakia.** Acta Ophth., 1944, v. 21, pt. 4, pp. 303-315.

The tabulated data on the visual fields of 24 persons with unilateral aphakia show that in the aphakic eye there is a moderate narrowing of the visual field amounting to about 10 degrees, which must be attributed to the reduced refractive power of the eye. Such an eye, however, contributes to the total function of the eyes and the desirability of additions to the binocular visual field is an indication for a cataract extraction. Ray K. Daily.

Chace, R. R. **Congenital bilateral subluxation of the lens.** Arch. of Ophth., 1945, v. 34, Nov.-Dec., pp. 425-426.

Dislocated lenses in the eyes of a girl, six years of age, are described. The child's maternal grandfather, her mother, and a maternal aunt all had the same condition in both eyes. All were operated upon with varying results; in one of them the operation was followed by glaucoma and later by detachment of the retina.

John C. Long.

Doggart, J. H. **Partial cataract in men of military age.** Arch. of Ophth., 1946, v. 35, March, pp. 280-290.

Although the word "cataract" is often understood to mean a serious disturbance of the lens in one or both eyes, it has a less sinister significance in ophthalmologic circles, where cataract is defined as a partial or complete decrease in the transparency of the lens. Thus, the term used in its technical sense embraces numerous examples of lenticular opacities which are innocent in that they are either stationary or else advance so slowly as to entail no appreciable handicap within the average span of life.

This survey arose out of the interest shown by the Medical Directorate of the Royal Air Force concerning the relative frequency and practical significance of certain forms of opacities of the lens among men of military age.

In this very readable paper, the author gives the following summary of his investigation.

1. Three hundred men, selected at random, and not complaining of ocular symptoms, were searched for the presence of cataract, so far as that condition is accessible to view through the undilated pupil under the magnification of a loupe.

2. Their ages ranged from 19 to 60 years. The average age was 28.2 years. The percentages of air crew members and ground staff were, respectively, 63 and 37.
3. The total incidence of cataract was 94.3 percent. Many of the men displayed more than one form of opacity, so that the percentages of the individual types of cataract totaled more than 100. The distribution was as follows:

Type of Cataract	Percentage
Scattered dots (including dust-like opacities in concentric layers)	93.0
Cataracta centralis pulverulenta	21.7
Coronary cataract	6.0
Anterior axial embryonic cataract	4.0
Dilocerated cataract	1.3
Suture cataract	1.0
Anterior capsular cataract	1.0
Senile cataract	0.3

Doggart concludes that cataract is common and usually harmless and if mentioned at all, the doctor should give a prognosis based on a close study of the type of cataract encountered.

R. W. Danielson.

Greene, P. B. **Keratoconus posticus circumscriptus.** Arch. of Ophth., 1945, v. 34, Nov.-Dec., pp. 432-433. (See Section 6, Cornea and sclera.)

Gundersen, Trygve. **Observations on the Vossius ring.** Amer. Jour. Ophth., 1946, v. 29, July, pp. 837-845. (1 table, references.)

Lawrence, R. D. **Temporary cataracts in diabetes.** Brit. Jour. Ophth., 1946, v. 30, Feb., p. 78-81.

In two myopic patients who had been examined at the onset of diabetes and were at that time found to have clear lenses, lenticular opacities appeared 16 days and three days after commencement of a restricted diet and treatment with insulin. They lasted three to five weeks and disappeared entirely. It is suggested that these lens changes were brought on by changes in hydration, both dehydration and rehydration.

Morris Kaplan.

Steffen, R. **Posterior pseudo-lenticonus.** Klin. M. f. Augenh., 1943, v. 109, March-April, p. 176.

The definitely soft blind eye of a child, two years of age that had an opacity in the posterior portion of the lens, a pea-sized shadow behind it, and whitish strands in the vitreous, was enucleated because of the possible presence of an intraocular tumor. Biomicroscopically loose strands that originated in the region of the disc and spread into the tumor-like mass behind the lens were seen. The retina was partially detached. Histologic sections revealed a cone-shaped protrusion of the posterior surface of the lens that was probably not a congenital malformation but probably a mass of retrolental connective tissue. Apparently an organized inflammatory exudate that compressed the lens peripherally caused the conical bulging of its posterior portion. Clinically the lesion gave the impression of a tumor and might be classified as a pseudo-glioma. (2 photographs, references.)

F. Nelson.

Suellmann, H. **The tryptophan content of the lens proteins.** Ophthalmologica, 1944, v. 108, Dec., pp. 281-287.

The tryptophan content of the lens proteins in the eyes of calves, cattle, and pigs was determined by the author.

He used various methods (formaldehyde reaction, glyoxl acid reaction) with hydrolysed and non-hydrolysed lens protein and found that tryptophan is 3.5 to 5.3 percent of the total protein. Beta-crystalline contained the most, alpha-crystalline the least tryptophan. The result in cataractous lenses did not vary from those in young lenses. The values obtained by the various methods are critically dealt with and compared with those found by other authors. (Literature.) Max Hirschfelder.

Vetter, J. **Bilateral atypic lens coloboma connected with ectopia.** Klin. M. f. Augenh., 1943, v. 109, March-April, p. 180.

A man 40 years of age who had worn glasses since he was seven years of age had noted diplopia, and later multiple vision, for 19 years. One of the double images often changed its position, especially when he was riding a bicycle on rough pavement. The right lens had been needled previously but was only partially absorbed. Both lenses were small, dislocated toward the nasal side, and had indentations on the temporal side. The zonula fibers were small in number and atypically arranged. Accommodation was almost normal. Iris and choroid were normal. No malformation of the eyes were noted in other members of the family, although two sisters were myopic (7 D. and 20 D.). For the development of atypic coloboma a complete lack of zonula fibers in the colobomatous area is not necessary. Defects in the equatorial region can be caused by a subnormal number of fibers particularly if the normal function of the single fiber is impaired by abnormal arrangement. Coloboma of the lens is probably not a primary inherited malformation but may be secondary to changes in the development of the mesodormal tissue in the interior of the eye. (2 pictures, references.) F. Nelson.

Weekers, Roger. **Cataracts in hypocalcemia and their medical treatment.** Ophthalmologica, 1944, v. 107, May-June, pp. 257-281.

After a short review of experimental cataract and a discussion of its pathogenesis and treatment, the author reports nine cases of hypocalcemic cataract in detail. Seven followed strumectomy and two were combined with idiopathic tetany. He also mentions the cataracts which develop in hypocalcemia without parathyroid insufficiency, as in nontropical sprue, dinitrophenol poisoning and severe nutritional deficiencies, as well as the similar cataract of myotonic dystrophy.

The morphologic picture of hypocalcemic cataract is characteristic. After a stage of swelling of the lens and an increase in refraction, small radial superficial opacities and colored crystals appear under the posterior and anterior capsule. The nucleus usually loses its transparency before the whole cortex is involved.

The author emphasizes the importance of preventive measures and early diagnosis of the hypocalcemia by checking the calcium content of the blood frequently. Medical treatment is promising, even when signs of visual disturbances are already present. A lenticular mypoia may disappear without a trace. The same is true for incipient opacities but when they reach a certain density the process is not reversable.

The drugs used to bring the calcium content of the blood to normal levels are vitamine D, AT 10 which is irradiated dehydrotachisterol, and para-

thyroid extracts. In favorable cases they prevented and retarded the development of cataracts. (References.)

Alice R. Deutch.

Wolff, Eugene. **Some aspects of the normal histology of the suspensory ligament of the lens.** Proc. Roy. Soc. Med., 1946, v. 39, March, p. 253.

The suspensory ligament of the lens is found to be composed of posterior fibers from the ora that are inserted into the posterior lens capsule, anterior fibers from the valleys between the ciliary processes and the pars plana, auxiliary fibers, and equatorial fibers which decrease in number with age. The "hyaloid" quality of the anterior hyaloid membrane is believed to be due to the hyaloid zonular fibers.

There is still a question as to the origin of the zonular fibers. The author believes that they pass to the internal limiting membrane of the ciliary body, although they may appear to have an interepithelial origin because of the concealing effect of papillary projections of the nonpigmented cells of the ciliary epithelium.

Benjamin Milder.

10

RETINA AND VITREOUS

Arruga, H. **Origin and healing of retinal detachment.** Klin. M. f. Augenh., 1943, v. 109, March-April, p. 145.

Since Gonin published his studies it is generally recognized that the formation of a hole or tear in the retina is responsible for its detachment and that a cure can be accomplished by closing and attaching the torn area. Holes can be caused by degenerative or inflammatory changes in the retinal tissue, very frequently where retina and vitreous body are adherent to each other. Experimental chemical or thermal irritation applied to the surface of the sclera of the eyes of dog, rabbit or cat invariably cause adhesion of the retina to the vitreous that can be seen anatomically. However a retinal detachment does not result from such an irritation since all three membranes, sclera, choroid and retina, are involved in the inflammatory process that follows the irritation. In human eyes a retinal detachment occurs rarely in the presence of a serous choroiditis, but can be more frequently expected when a chorioretinal inflammation predominates in the retina to such a degree that adhesion between choroid and retina does not take place. Shrinkage and retraction of the vitreous body is a physiological process which is progressive from childhood to old age. In the production of retinal holes and subsequent detachment this shrinkage plays a major part, especially where adhesions between retina and vitreous exist. Cystic degenerations in the retinal tissues are often the cause of hole formation. The formation of horseshoe tears in the retinal periphery is influenced by the direction and number of nerve fibers which is diminished toward the periphery. Blood vessels and nerve fibers form the skeleton of the retina. Hole formations in the vicinity of the disc where the layer of nerve fibers is thicker than elsewhere are extremely rare and they are not uncommon in the macula where vessels are absent. When idiopathic retinal detachment occurs only the retina shows pathological changes. The more pronounced the changes are the more serious is the prognosis. Most commonly retinal detachment seems to be produced by a tear in the retina where it is attached to the structure of the vitreous body and where the choroid is nor-

mal. The movements of the vitreous enlarge the holes. Vitreous and eye movements play the most important role in the healing process; it depends upon the absorptive action as well as on the inflammatory reaction of the choroid (adhesive choroiditis). The retina itself plays a passive part only.

F. Nelson.

Benkwith, K. B. **Retinal hemorrhage as seen in an atomic-bomb casualty.** Amer. Jour. Ophth., v. 29, July, pp. 799-800. (1 figure, 1 color plate.)

Bhalerao, C. K. **Retinitis pigmentosa.** The Antiseptic, 1946, v. 43, March, p. 173.

The author restates the more important knowledge of retinitis pigmentosa. He advises sight saving class early for patients of this type in order to comfort them when the disease is advanced.

I. E. Gaynon.

Blum, J. D., and Jeanneret, H. **A new anticoagulant in the treatment of retinal venous thrombosis.** Ophthalmologica, 1944, v. 108, Sept., pp. 129-136.

Dicoumarin was originally a product of sweet clover but was synthesized in 1941 and has been in use since 1942. It increases coagulation time by retarding the formation of prothrombin, although the variations in coagulation time in prothrombin time are not proportionate.

The dosage varies between one-half and four milligrams per Kilogram of bodyweight per day. Its action is slow and its anticoagulant effect becomes manifest after 48 to 72 hours. After that time the prothrombin time must be checked regularly. A prothrombin time of 30 to 45 seconds is considered to be within safe limits, 60 to 80 seconds is a danger sign.

Contraindications in the use of Dicoumarin are malignant vascular sclerosis, arterial hypertension, and increased capillary permeability.

Its advantages, if compared with heparin, are the reasonable price, the administration by mouth, and its prolonged action.

Seven case histories are reported in detail. Three patients had complete thrombosis and four had thrombosis of a branch of the retinal vein. The practical value of the combined use of heparin and dicoumarin is outlined. (2 figures, references.)

Alice R. Deutsch.

Canella, Francisco. **Bilateral thrombosis of the central retinal vein.** Arch. da la Soc. Oft. Hisp.-Amer., 1945, v. 5, March, pp. 164-168.

A case report.

J. Wesley McKinney.

Casanovas, Jose. **Grouped pigmentation of the retina.** Arch. de la Soc. Oft. Hisp.-Amer., 1945, v. 5, Feb., pp. 129-132.

The author reports a case of a rare congenital anomaly described by Niels Hoeg under this name, by Leber under the name of nevoid pigmentation of the retina, and by Kraupa as melanosis of the retina. The anomaly consists of a grouped formation of round or polygonal dark areas, located behind the retinal vessels in some segment of the retinal periphery. It is formed in the early stages of ocular development, and is due to an irregular distribution of the cells in the retinal pigment layer. Its clinical significance lies in the possibility of its confusion with hemorrhages or pathologic pigmentation. (2 colored illustrations.) Ray K. Daily.

Cockburn, C. **Ocular cysticercus cellulosae.** Brit. Jour. Ophth., 1946, v. 30, Feb., pp. 65-74. (See Section 17, Systemic diseases and parasites.)

Cridland, Nigel. **Neuroretinitis of unknown origin.** Proc. Roy. Soc. Med., 1946, v. 39, March, p. 245.

A man, 24 years of age, suffered a progressive loss of the peripheral field to five degrees, in a period of six months. The visual acuity remained 6/5, and the fundus appeared normal. Three months later the field was smaller (three degrees), and a trephine operation was performed to aid retinal circulation. There was no further change in the field or visual acuity. The fundus showed some fine pigment deposits along the inferior nasal vein and equiyocal retinal edema. After three years there is no further change, except for fine diffuse areas of chorioretinitis. The only explanation offered was that the initial lesion was a superficial widespread choroiditis.

Benjamin Milder.

Granstroum, K. O. **Retinal hole observed fifteen months before detachment of the retina.** Acta Ophth., 1943, v. 21, pt. 3, pp. 204-209.

In the emmetropic eye of a woman, 54 years of age, a typical retinal hole was observed fifteen months before retinal detachment occurred. A review of the literature shows a divergence of opinion as to the necessity of surgical treatment for such eyes. The occurrence of detachment in this patient leads to the conclusion that a prophylactic operation should have been performed. Ray K. Daily.

Gronvall, Herman. **A case of chloroma of the orbit with fundus changes.** Acta Ophth., 1944, v. 21, pt. 4, pp. 206-266. (See Section 13, Eyeball and orbit.)

Harlow, H. D. **Retinal detachment secondary to conglomerate tubercle of the choroid.** Amer. Jour. Ophth., 1946, v. 29, July, pp. 869-871. (References.)

Jebejian, R., and Kalfayan, B. **The oculo-bucco-genital syndrome.** Ann. d'Ocul., 1945, v. 178, Aug., pp. 335-344. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Jevons, N. A. **A case of eclipse blindness.** Brit. Jour. Ophth., 1946, v. 30, Feb., pp. 84-85.

A case of eclipse blindess that appeared a few hours after exposure is described. It was characterized by diminished vision, a positive scotoma, and an obvious hole in the macula. The damage apparently was permanent. (Illustration.) Morris Kaplan.

Louis-Bar, D., and Pirot, G. **Spastic paraplegia combined with degeneration of the macula in two brothers.** Ophthalmologica, 1945, v. 109, Jan., pp. 32-43.

In presenting the unusual occurrence of several degenerative diseases in two brothers, the authors take the opportunity to discuss the interesting problem of the heredity of pathologic lesions and their simultaneous occurrence in one individual. The brothers had a degeneration of the macula associated with a spastic paraplegia of the Strümpel type. In one of them it was the infantile form and in the other the adult form. In one of them the spastic paraplegia was accompanied by an amyotrophic spinal lesion. A third member of the family had an atypical spastic paraplegia. The investigation of the heredity of the abnormalities in the family was necessarily incomplete.

The authors believe that the degenerations of the macula in their patients were of the type described by Franceschetti in patients with Freidreich's ataxia. No similarly afflicted family has been described. Alice R. Deutsch.

Ortin, G. L. **Retinitis pigmentosa.** Arch. de la Soc. Oft. Hisp.-Amer., v. 5, Feb., pp. 92-111.

The importance of consanguinity and the futility of therapy are the features emphasized. After surveying briefly the known facts in the pathogenesis of the disease Ortin concludes that the primary lesion is a destruction of the neuro-epithelium. Reference is made to McDonald's and Adler's study on the relation of pituitary disease to retinitis pigmentosa, and their opinion denying the influence of a pituitary hormone is accepted. The theurapeutic procedures advocated are mentioned with scepticism in their efficacy. In the author's personal experience injections of acetylcholin and atropin intravitreally and retrobulbarly were without effect. Effective prophylaxis through genetic regulation and elimination of consanguinous marriages, is strongly urged. (8 fundus photographs, 32 visual fields.) Ray K. Daily.

Panneton, P. **A curious lesion of the fundus.** Arch. d'Opht., 1945, v. 5, no. 3, p. 328.

The author describes the eyes of a man, 44 years of age, with vision reduced to 0.2 in the right eye as the result of infectious keratitis that had occurred some two months before examination. The left eye was externally normal and had a vision of 0.9. In this eye, however, there was a whitish mass at the upper temporal margin of the nervehead about half the size of the disc in area. The mass was elevated about three diopters and the borders were sharp. The color was a grayish white with a suggestion of cholesterin crystals. The mass obscured the upper temporal vessels. Otherwise the fundus was completely normal. The author discusses the various etiological possibilities, particularly gumma, tuberculoma, and tumor. He suggests that the mass may be a conglomeration of cholesterin crystals.

Phillips Thygeson.

Pinkerton, O. D. **Angioma of the retina.** Amer. Jour. Ophth., 1946, v. 29, June, pp. 711-712. (3 figures.)

Ploman, K. G. **Treatment of thrombosis of the retinal veins with heparin.** Acta Ophth., 1943, v. 21, pt. 3, pp. 190-203.

This report is based on 41 cases of thrombosis of the central retinal veins and 40 cases of thrombosis of tributary veins. The tabulated data show that the best results were obtained in younger patients and in those in whom therapy was instituted early. The patients who were not benefited had hemorrhages into the vitreous or the retina. Secondary glaucoma and central choroiditis were causes of failure in some patients. When the thrombosis occurred in a branch of the vein, improvement was noted in the eye of almost half of the patients. In practically every case sinuous veins, uneven in calibre, and with thickened walls were left in the affected area. Similar changes took place in the concomitant artery. It is useless to treat patients with massive hemorrhages that obscure the papilla and the macula, and those who have increased tension. Impairment of visual acuity should not be the deciding factor, because it sometimes improves rapidly during the

course of treatment. If the papilla is visible, and the hemorrhages not too extensive, heparin should be tried.

Ray K. Daily.

Poirier, R. A. **Saccular prolapse of the vitreous body.** Amer. Jour. Ophth., 1946, v. 29, July, pp. 845-847. (References.)

Rasmussen, Knud. **Retinoblastoma in a man forty-eight years of age.** Acta Ophth., 1943, v. 24, pt. 3, pp. 210-213.

To the small number of reported cases of this tumor in adults, the author adds one. The patient was treated for two years for keratitis, iritis, and secondary glaucoma. When light perception was gone, the eye was finally enucleated, and was found to contain a retinoblastoma. (1 illustration.)

Ray K. Daily.

Redslob, E., and Koutseff, A. **Postpartum retinopathy.** Ann. d'Ocul., 1945, v. 178, Oct., pp. 425-440.

During pregnancy ovarian hormones, especially folliculin, and placental hormones greatly increase the activity of the entire endocrine mechanism, especially the pituitary which physically, by swelling, produces bitemporal field contractions and chemically by the increased hormone production, especially of oxytocin, partly causes the uterine contractions of labor. Among the abnormalties of this complexly balanced process are quantitative and qualitative changes in the vaso-pressor system which produce hypertension in the predisposed. The stages are angiospasm, angiosclerosis, exudation with or without necrosis, and other complications. The tissues most frequently involved are the kidneys, the liver and the retina. In severe forms, eclampsia with retinopathy results. The tendency to angiospasm and therefore hypertension in pregnancy is aggravated by vaso-pressor hormones such as vasopressine, adrenalin, and folliculin. Generally speaking, the severity of the retinopathy is proportionate to the vascular hypertension rather than to the kidney involvement. Two illustrative cases are presented, both apparently with hereditary lues. In the first patient eclampsia with bilateral retinal exudation and detachment occurred several hours after a normal labor. A subsequent pregnancy was terminated to save the life of the patient. The second patient also developed eclampsia and bilateral retinal exudation and detachment after she had been delivered of an apparently normal child during the seventh month of pregnancy. Three months later the eye and vision were normal. (15 references.) Chas. A. Bahn.

Rosengren, B., and Stenstrom, S. **Thirty cases of thrombosis of the retinal vein treated with heparin.** Acta Ophth., 1942, v. 20, pt. 2., pp. 145-152.

The conclusions are based on a detailed analysis of 30 cases. After 250-375 milligrams of heparin had been administered daily for an average of 10 days, visual acuity had improved in 21 patients, had deteriorated in five, and remained unchanged in four. The average visual acuity before heparin therapy was .239; at the end of heparin therapy, it rose to .375. After the administration of heparin was discontinued, there was a slight loss. These findings support the belief that in many cases heparin therapy leads to improvement, which is later partially lost. Ray K. Daily.

Scheie, H. G., and Freeman, N. E. **Vascular disease associated with angioid streaks of the retina and pseu-**

doxanthoma elasticum. Arch. of Ophth., 1946, v. 35, March, pp. 241-250.

During the past two years angioid streaks of the retina were seen in three patients, in two of whom pseudoxanthoma elasticum was also present. In these two patients severe vascular disturbance was found in all the extremities. No mention of a relationship of these three conditions has been found in the available literature and whereas the association is probably significant, the cases are being reported.

Pseudoxanthoma elasticum is a degenerative disease of the skin. The coexistence of osteitis deformans and angioid streaks of the retina is also noteworthy.

Angioid streaks of the retina are rather rare. The retinal picture is characteristic. It consists of pigmented streaks, radiating spokelike from a similarly pigmented ring which encircles the disk. This ring may be complete or incomplete and may be formed by a single pigmented line around the disk, or it may be made up of several interlacing lines of pigment. It may encircle the disk closely, with only a small band of retina intervening, or the ring may be 0.5 d.d. or more away. The borders are serrated.

Pseudoxanthoma elasticum is an abnormality of the skin that is made manifest by yellowish patches, that vary in size from that of a pinhead to that of a pea, with roughening of the skin much like the striae atrophicae of pregnancy.

Obstruction of peripheral blood vessels or serious circulatory disturbance has not previously been reported.

The angioid streaks of the retina, pseudoxanthoma elasticum, and vascular disturbance reported in two patients were believed to be a manifestation of a general degeneration of elastic tissue throughout the body and will probably be found to occur together not infrequently when such cases are studied with this in mind.

R. W. Danielson.

Vail, Derrick. **The scleral-resection (eyeball-shortening) operation.** Amer. Jour. Ophth., 1946, v. 29, July, pp. 785-799. (1 color plate, 7 figures, references.)

Van Manen, J. G. **Congenital sickle-shaped retinal detachment and associated congenital anomalies.** Ophthalmologica, 1944, v. 107, March-April, pp. 121-148.

Two congenital anomalies of the fundus were seen by the author in the Netherlands-Indies where congenital anomalies of the eyes are not rare among the natives and are favored by intermarriage of members of the same tribe.

In a boy 16 years of age whose left eye only was affected, the optic disk was pale and a grayish transparent strand extended towards the periphery in the horizontal meridian. Another but shorter and less transparent strand surrounded the region of the macula like a dense sheath. It extended straight into the vitrous perpendicular to the retina, and with the other strand formed a fanshaped veil which reached the ora serrata. In the region of the posterior pole there were spots of fine pigment and coarse dots with many glittering points in the retina, which was scarcely pigmented at all elsewhere. The lens was clear. The eye was emmetropic and vision was reduced to the ability to count fingers at two meters.

The second case occurred in a boy, six years of age. He had a typical sickle-shaped congenital retinal de-

tachment in the inferior temporal quadrant that was more pronounced in the left eye where it was associated with an anomaly of the retinal artery. Nystagmus was present and his vision was very poor.

The author also reviews ten cases of this eye affection which were reported under different names and discusses the pertinent pathologic studies.

To explain the probable genesis of sickle-shaped, congenital retinal detachment and allied anomalies a detailed embryologic study is added to this paper. Superficial branches of the hyaloid artery which normally are obliterated in the 40 millimeter stage retain their delicate fibrillary connection with the retina and by their persistence nourish and increase the growth of the mesoderm at the lens equator. The latter adhers to the adjoining retina. The growing eyeball stretches the persistent vessels which are covered by the congenital neuroglia of Bergmeister and by the mesoderm at the posterior lens capsule. The retina, fixed to the vessels, must give way and form a fold. (6 figures, references Alice R. Deutsch.

Weber, Ernst. **Biomicroscopic investigation of the anterior limitation of the vitreous and its connection with the lens.** Klin. M. f. Augenh., 1943, v. 109, March-April, p. 169.

In continuation of a previous article concerning the free layer of the vitreous lamella and its delimitation from the plicata, a lenticular membrane of the vitreous lamella is described which is often not visible but can become manifest in senile eyes and after posttraumatic and inflammatory processes. The free vitreous layer plus the lens lamella form the anterior limit of the vitreous which is visible in slitlamp illumination. The plicata plays no important part as an anterior limiting membrane. Characteristic for the detachment of the lens membrane of the vitreous lamella are the following: (1) an optically empty space behind the lens, (2) the usual jerky movements are small or absent (in contrast to the plicata), (3) vivid iridescence, (4) the membrane is not folded like the plicata but is stretched tightly, (5) occasionally, especially after trauma, fine parallel striation is present, (6) usually it can be isolated from the rear surface of the lens only in very narrow optical sections. Detachment of the lens lamella can be proved by the visible continuation of the plicata, towards the vitreous lamella, direct transition into the free layer of the vitreous lamella, and by apparent detachment of the hyaloid canal at its insertion at the rear of the lens. Each one of these three symptoms is sufficient for the diagnosis of detachment of the lens lamella. (3 color plates, 4 drawings, references.)

F. Nelson.

Weekers, Roger. **The impairment of the circulation and the function of the retina in the post-concussional syndrome.** Ophthalmologica, 1944, v. 108, Oct.-Nov., pp. 169-186.

The post-concussional syndrome has been considered a manifestation of a neurosis or of simulation. The most important result of this study is the discovery of a new sign for its diagnosis, namely, the extension and abnormal increase of the angioscotomas. This observation also has a pathologic interest because it stresses the importance of circulatory changes. It is of practical interest because it helps to verify the diagnosis and to outline the seriousness of the affection, its course and prognosis.

The author describes the anatomy of the retinal and choroidal circulation and the methods for examination of the retinal function. The technique of the angioscotometry, its variations and the interpretations of its findings are discussed in detail as are the changes in the adaptation curves and in the color sense.

The author found that narrowing of the central and peripheral isopters can arise without excessive fatigue and without neurosis. This results from an extension of the vessel scotomas, as does the decrease in the visual acuity and retinal asthenopy. Under the technical conditions at hand, the dark adaptation only was impaired in several afflicted patients who also showed considerable contraction of the fields and impaired visual acuity. There was no change in the color sense other than a concentric contraction of the peripheric isopters for colors. The enlargement of the angioscotomas may arise from a change in the conduction of the neurons and synapses of the retina that is caused by disturbances of the circulation in the retinal vessels.

The study of the functional deficiency of the retina permits an approximate estimation of the severity of the post-concussional syndrome. In this respect three categories might be distinguished: grade 1, increased angioscotoma only, capable of improvement or complete recovery; grade 2, contraction of the middle and peripheral isopters, always accompanied by serious general symptoms and a slow recovery, grade 3, the impairment of the retinal circulation is so severe that not only the fields but also the visual acuity is very much impaired. The prognosis is grave. (2 field charts, references)

Alice R. Deutsch.

Weekers, R., and Humblet, M. **Physiological angioscotoma.** Ophthalmologica, 1945, v. 110, July-Aug., pp. 43-59.

The authors describe a new and especially exact method for plotting physiological angioscotomas. They discuss variations in angioscotomas, their theoretical significance, and their importance in health and disease. They correlate their findings with the appearance of the retina in ophthalmoscopy and in fundus photographs. The vascular origin of the behavior and etiology of these physiologic restrictions in the fields is clearly demonstrated. They use Bjerrum's tangent screen made of black wool that is free from reflections. The fixation point is a hole illuminated from behind by a red light. The tangent screen is uniformly illuminated by two tubes whose light is regulated by the interposition of a diaphram. Three to five lux is the most desirable illumination. The testmarks are of a mat white and one to 15 millimeters in diameter.

In experimental anoxemia, in glaucoma, and after cerebral concussion, disturbances in the visual fields were found which resemble angioscotomas but are much broader and denser. Whenever this occurs the physiological angioscotoma disappears in the much larger pathological scotoma. (6 figures, references.) Alice R. Deutsch.

Zorab, E. C. **Solar eclipse—burn of macula.** Brit. Jour. Ophth., 1946, v. 30, Feb., p. 82-84.

A soldier complained of reduced vision in the right eye four days after watching a partial eclipse of the sun intently without adequate protection. He complained of reduced vision in the left eye and the constant presence of a shadow. The shadow was of the

exact shape of the uneclipsed portion of the sun. This remained for 20 days and improved slightly. In each macula there was no light reflex and a dark red spot in the center about 0.25 mm. in diameter with a very pale arc surrounding it about 0.75 mm. in diameter. Morris Kaplan.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Antoine, R., Legroux, R., and Stricker, P. **A case of severe quinine amblyopia.** Arch. d'Opht., 1945, v. 5, no. 3, p. 349.

A case of toxic amblyopia following the ingestion of 6.0 gm. of quinine given for malaria is reported. Vasodilators were employed immediately but when the patient was first seen by the authors, several weeks later, there was complete mydriasis with absence of pupillary reflexes and of light perception. Injections of acetylcholine were given and the drug was applied to the sphenopalatine ganglia. There was improvement within 48 hours; light perception first returned in the temporal fields. After six days light projection was recognized everywhere except in the nasal fields and the visual acuity was 0.7 right eye and 0.5 in the left. Because the visual fields remained markedly constricted, the superior cervical sympathetic ganglia were infiltrated with procaine daily; definite improvement followed. Several months later the patient had a recurrence of malaria which was treated with quinacrine over a ten-day period. Although visual acuity remained unchanged after this treatment, there was marked contraction of the fields of the left eye. This contraction disappeared, however, after a single blocking of the superior cervical sympathetic ganglion.

The authors consider this case to be further proof of the role of vasoconstriction in the pathogenesis of quinine amblyopia. They discuss in some detail the anatomy of the cervical sympathetic chain and conclude that almost all vasodilator fibres pass by way of the superior cervical ganglion.

Phillips Thygeson.

Bordier, F. **Inquiry into ocular intoxication caused by tobacco called "green."** Ann. d'Ocul., 1945, v. 178, Sept., pp. 370-376.

A farmer, 74 years of age, experienced amblyopia, central scotomata, internal ophthalmoplegia, slight myopia, and retinal arterial hypertension. These manifestations were apparently caused by smoking daily approximately 30 cigarettes of his home grown, home cured tobacco. After changing to another tobacco, possibly smoking less, and taking vitamin B, his symptoms disappeared. The author concludes that the home grown tobacco contained different toxic substances which affected the retinal cones and the contractility of the unstriped muscular tissue contained in the arterioles of the iris and ciliary muscle.

Chas. A. Bahn.

Falomir, Eduardo W. **The problem of optic neuritis.** Arch. de la Soc. Oft. Hisp.-Amer., 1945, v. 5, March, pp. 169-172.

A brief discussion of the differential diagnosis of optic neuritis and papilledema is presented.

J. Wesley McKinney.

Porsaa, Kaj. **Papilloedema in iridocyclitis.** Acta Ophth., 1944, v. 21, pt. 4, pp. 316-329.

Three cases are reported, one chronic and two acute. The edema in-

volved the optic nerve, blurring its margins, and extended into the retina, toward the fovea. There were a few exudates and hemorrhages in the edematous area, the retinal veins were engorged, and there were vitreous opacities. The ocular tension was normal. The vision was not impaired by this process and recovery was complete. Porsaa reviews the literature, which supports the theory that this is a toxic collateral edema, with stasis in the retinal veins, due to the inflammatory process in the anterior ocular segment.

Ray K. Daily.

12

VISUAL TRACTS AND CENTERS

Feigenbaum, A., and Kornblueth, W. **Paralysis of convergence with bilateral ring scotoma following injury to occipital region.** Arch. of Ophth., 1947, v. 35, March, pp. 218-226. (See Section 4, Ocular movements.)

13

EYEBALL AND ORBIT

Babel, J., and Valerio, M. **Amputation-neuroma of the orbit.** Ophthalmologica, 1945, v. 109, June, pp. 317-323.

The authors describe two cases of amputation-neuroma in the orbit.

The eyeball of a man, 40 years of age, was enucleated because of recurrent inflammations which followed a perforating injury. Severe pain in the socket started several years later, after an apparently unimportant orbital trauma. The pathologic examination after surgical exploration showed a growth the size of a cherry stone, which was not encapsulated. It was a typical amputation-neuroma with chronic inflammatory cellular infiltration. In the stump of the optic nerve there was a small granuloma with giant cells.

In the second patient the eyeball was removed because of complications after trachoma. Here a real tumor was not present, but a large number of myelin free nerve fibers in irregular arrangement. The ends of the severed nerves were visible and also many regenerated nerve fibres, but there were no inflammatory changes. There had been no pain before the operation.

The phenomenon of nerve regeneration in the orbit has never been described before though it does not seem to be rare. The ciliary nerves seem to be the origin of the tumor. It might be the cause of considerable pain after enucleation, especially if inflammatory foci should develop in the stump. (5 figures, references.)

Alice R. Deutsch.

Bendor-Samuel, J. E. L. **A case of siderosis bulbi.** Brit. Jour. Ophth., 1946, v. 30, Feb., pp. 85-88.

A soldier complained of pain in a blind eye that had had penetrating trauma a year before. A traumatic cataract and siderosis bulbi were present. A foreign body was removed by means of a magnet through a posterior incision in the sclera. The cataract was removed. After a needling the vision was corrected to 6/12 though the pigment deposits remained.

Morris Kaplan.

Chavany, J. A. **Orbito-temporal osteoma with exophthalmos in syphilitics.** Presse Medicale, 1945, No. 51, Dec. 22, p. 702.

Chavany reports two cases of exophthalmos in syphilitic patients. In the first patient the exophthalmos was unilateral, of six years duration, and caused by a painless bony mass in the

temporal part of the orbit. Ocular function was normal. The diagnosis of osteoma was confirmed by X-ray examination. All other physical and laboratory findings were negative except for positive Bordet-Wassermann reactions. A diagnosis of syphilis was confirmed by a history of repeated miscarriages. Intensive antisyphilitic therapy with bismuth and potassium iodide failed to influence the eye lesion but did render the serologic reaction negative.

The second patient presented a hard, painless tumor of the left orbito-temporal margin with marked exophthalmos. Radiography showed a condensation of the bone in this area. Symptoms were of three years duration, the onset of the lesions was insidious, and the progression was slow. Physical findings were otherwise normal except for an Argyll-Robertson pupil. Serologic reactions of the blood and spinal fluid were negative but antisyphilitic therapy seemed to be indicated nevertheless.

The author believes that antisyphilitic therapy must be tried but if the lesions progress under therapy the possibility of osseous syphilis is eliminated and surgery is indicated.

Phillips Thygeson.

Gronvall, Herman. **A case of chloroma of the orbit with fundus changes.** Acta Ophth., 1944, v. 21, pt. 4, pp. 260-266.

The initial symptom of a fatal case of chloroma in a girl five years of age, was a swelling in the right orbit. The child had a displacement of the right eyeball downward and nasally, and ptosis of the lid. The fundus was pale, the vessels bright, wide, and tortuous. The disk margins were obscured and the temporal portion of the disk was pale and surrounded by fine hemorrhages. There was a large hemorrhage in the macula and fine hemorrhages in the periphery. The fundus of the left eye presented a similar picture without a macular hemorrhage. The diagnosis was made from the blood picture, and confirmed at autopsy. This disease should be considered in the differential diagnosis of orbital tumors in children. (1 illustration.) Ray D. Daily.

Hinterleitner, K. **Tuberculosis of the orbital tissue.** Ophthalmologica, 1944, v. 108, Oct.-Nov., pp. 210-216.

The author observed two cases of tuberculosis of the orbital tissue. The first patient, a woman 57 years of age, presented a swelling of the lower eye lid, moderate exophthalmus, a hard, indolent mass at the lower orbital margin that spread towards the depth of the orbit and negative X-ray plates. Tuberculin reaction was positive. A biopsy demonstrated tuberculous granulation tissue with giant cells. Treatment by means of Xrays and arsenic lead to improvement. The second patient, a 12-year-old girl, had a slowly growing small mass under the upper orbital rim. The mass was extirpated and found to consist of infiltrates of lymphocytes and epithelioid cells. There was complete recovery without recurrence. The author discusses the literature on primary tuberculosis of the orbit. (Bibliography).

Max Hirschfelder.

MacKenzie, C. M. **Choice of grafts for orbital reconstruction.** Amer. Jour. Ophth., 1946, v. 29, July, pp. 867-869. (7 figures, references.)

Mann, Ida. **Exophthalmic ophthalmoplegia and its relation to thyrotoxicosis.** Amer. Jour. Ophth., 1946, v. 29, June, pp. 654-673. (36 figures, 1 table, references.)

Muzzio, J. C. **Orbital complications of sinusitis.** La Semana Méd., 1946, v. 53, April 4, pp. 593-604.

The author relates nine cases. In each case the causal factor was a cold or influenza. Polysinusitis predominated over monosinusitis in the production of orbital complications. Although maxillary involvement is the most frequent form of sinusitis, it and sphenoidal localization produce the smallest number of orbital complications. Acute sinusitis, or reactivation of the chronic condition, will in most cases be adequately treated by medical procedures. If surgical care is necessary, this should at first be limited to drainage of the infected sinus or sinuses. The radical treatment may be postponed for weeks or months after the acute phase has receded or disappeared. (Bibliography.) W. H. Crisp.

Offret, M. C., and Offret, G. **Malignant exophthalmos in Basedow's disease. Etiologic and therapeutic study.** Arch. d'Opht., 1945, v. 5, no. 4, p. 429.

The authors define malignant exophthalmos as any exophthalmos, pre- or post-operative, accompanied by a lowering of vision. This drop in visual acuity may arise from such different sources as corneal ulceration or an optic nerve atrophy but the amount of visual loss may be considered a measure of the malignity of the exophthalmos. Unlike certain American authors they do not consider malignant only those cases in which the exophthalmos persists or is aggravated after thyroidectomy.

According to the authors the frequency of malignant exophthalmos has varied in the different series reported since 1840 when Basedow first noted the progressive character of the exophthalmos and consequent ulceration in certain cases. At least 100 cases have been reported in the literature; Sattler in 1909 summarized the data on 63 and the present authors did the same for 37. They discuss in turn the pathogenesis, the clinical aspects, the differential diagnosis, the pathologic anatomy, and the treatment of the condition and conclude that malignant exophthalmos in the course of Basedow's disease is an important cause of blindness and that it occurs most often after improvement or healing of the thyrotoxicosis. They consider that diffuse edema of the orbital tissues with hypertrophy of the extraocular muscles is the principal anatomic lesion and refer to the experimental studies which indicate that thyroidectomy plus overaction of the anterior lobe of the pituitary are significant factors. They note that exceptionally malignant exophthalmos can occur as a specific disease in the absence of any thyroid disturbance. They conclude that medical, particularly hormonal, therapy offers the greatest ultimate hope but that at the present time surgical decompression of the orbit, by various methods, is the most important treatment. Phillips Thygeson.

Peter, A. L. **Oxycephaly associated with Klippel-Feil syndrome and other skeletal defects.** Amer. Jour. Ophth., 1946, v. 29, June, pp. 694-698. (See Section 17, Systemic diseases and parasites.)

Pyeton, W. T., and Simmons, D. R. **Neurofibromatosis with defect in wall of orbit. Report of five cases.** Arch. Neurol. and Psychiat., 1946, v. 55, March, p. 248.

Recklinghausen's disease, neurofibromatosis, is a congenital defect which may affect any part of the body.

It is probably the result of defective germ plasm. Because of the mesenchymal origin of the lesions, it is understandable that many bony defects are associated with the disease. The skull is often the site of changes, not all of which are associated with contiguous tumors.

In the literature 20 cases are reported showing defects in the orbital roof, that allow free communication between the orbit and the intracranial cavity. Five such cases are reported by the authors. All were characterized by exophthalmos, usually of the pulsating type. Some of the patients had skin lesions of neurofibromatosis. Although the diagnosis was not immediately apparent in each case, it was possible to demonstrate roentgenographically an enlargement of the orbit and a defect in the roof. The exophthalmos may be due to (1) orbital neurofibromatosis or a coexisting orbital tumor, or (2) brain tissue in the orbit, producing the pulsations. The proper treatment in the latter instance is repair of the roof of the orbit by transfrontal craniotomy.

Benjamin Milder.

Šmejkal, V. **Injections of 90-percent alcohol in ophthalmology.** Praktický Lékař, 1946, v. 26, Feb. 5, pp. 81-82.

Excellent results were obtained with retrobulbar injections of 90-percent ethyl alcohol in 62 patients, under local anesthesia; 0.5 to 1.0 c.c. was injected in patients with spastic entropion or a painful blind eye. O. Felsenfeld.

14

EYELIDS AND LACRIMAL APPARATUS

Arruga, H. **Penicillin in a grave case of congenital dacryocystitis.** Arch. de la Soc. Oft. Hisp.-Amer., 1945, v. 5, Feb., pp. 133-134.

A congenital dacryocystitis with fistula formation, remained without improvement for five days under irrigation, protein injections, and sulfonamides. It cleared up within the next eight days, under irrigation with penicillin. The fistula closed, the lacrimal passages were open, and the epiphora subsided. Ray K. Daily.

Berke, R. N. **Blepharoptosis.** Arch. of Ophth., 1945, v. 34, Nov.-Dec., pp. 434-450.

This is a detailed review of the literature on the etiology, incidence, anatomy, and surgical treatment of ptosis of the upper lid and related defects. An outline is given for the preoperative study of this condition. The eighty or more operations for ptosis may be divided into three groups: (1) Suspension of the upper lid from the brow, thus utilizing the action of the frontalis muscle for lifting the lid. (2) Attachment of the upper lid to the superior rectus, thereby replacing the action of the levator by the lifting power of the superior rectus. (3) Enchancement of the normal action of the levator by advancing, tucking, or resecting this muscle.

None of these procedures are entirely satisfactory in all cases. As a general rule, resection of the levator palpebrae muscle is the operation of choice when this muscle is not paralyzed. Next in the order of preference is one of the operations which utilizes the superior rectus muscle. If this muscle is weak, the frontalis type of operation is indicated. John C. Long.

Crookes, G. P. **Traumatic blepharospasm as an isolated symptom.** Brit. M. J. 1946, no. 4447, March 30, p. 486.

The author reports a case of traumatic reflex blepharospasm of five day

duration in a girl 13 years of age. Blepharospasm was the only finding. Two c.c. of procaine solution was injected at the neck of the mandible and within five minutes all findings disappeared completely. I. E. Gaynon.

Dupuy-Dutemps, P. **Obliteration of the lacrimal passages and its treatment.** Ann. d'Ocul., 1945, v. 178, June, pp. 242-254.

In burns and injuries of the canaliculi with slight ectropion, canalicular slitting with excision of the conjunctival wall may suffice. In more severe ectropion, autoplasties such as the Kuhnt-Zymanowski procedure are more efficient. In slight infections, especially those that follow blepharoconjunctivitis, dilatation and irrigation may be sufficient. The use of large probes or other methods which traumatize the sac should be avoided because of ultimate cicatrization. In congenital obstruction of the sac the smallest probe will frequently restore potency by puncturing the unabsorbed nasolacrimal membrane. Severe infections in children should be reduced to a minimum. If necessary, the sac should be excised, but if it is at all possible, the operation should be postponed until about the twelfth year of life when a dacryorhinostomy can be performed. In traumatic strictures of all sorts this operation is the procedure of choice. Sac infection secondary to nasal infection is rare. In infective dacryocystitis complicated by corneal ulcer, extirpation of the sac is indicated because convalescence is more rapid. Cauterization of the sac by physical or chemical methods is not advised. Dacryorhinostomy is preferred because of its greater success and permanency. It is contraindicated in the aged and if the nasal mucosa is atrophic or badly diseased. Physiologic permeability is established in four to six weeks. Chas. A. Bahn.

Frouchtman, R. **The etiopathogenesis and treatment of blepharitis.** Arch. de la Soc. Oft. Hisp.-Amer., 1945, v. 5, March, pp. 173-184.

The study of a group of fifteen patients who had blepharitis leads the author to believe that the affection is a dermatosis localized in the lid borders. The development of the condition is subject to the many factors which contribute to the appearance of the allergic dermapathy. Constitutional predisposition, focal sepsis, the elimination of which is not always followed by cure, digestive factors, endocrine disturbances; hepatic insufficiency, affections of the anterior segment of the eye, mechanical physical and chemical agents, and sensitization to microbes which normally inhabit the skin are factors which the author considers. Sensitization to saprophitic bacteria of the air was shown to be causative in two patients who were cured by the injection of extracts of sarcinae. Several of these factors may be combined to give a complicated etiopathogenesis in any particular case of blepharitis.

J. Wesley McKinney.

Gauffre, R. **An operation for congenital coloboma of the upper lid.** Arch. d'Opht., 1945, v. 5, no. 3, p. 342.

The author reviews the operative indications in congenital coloboma of the upper lid and stresses that early operation may be mandatory to protect the exposed cornea. He states that the tissues of infants are particularly fragile and do not react well to traction or constriction and do not hold sutures well. In an effort to avoid complications arising from this tissue fragility

he employed akinesis with a solution of 40 percent alcohol to eliminate lid spasm and used warm saline dressings, changed every two hours, to minimize tissue swelling. Phillips Thygeson.

Gronvall, Herman. **On argyrosis and concretion in the lacrimal sac.** Acta Ophth., 1944, v. 21, pt. 4, pp. 247-259.

A review of the literature is followed by a detailed report of two cases. In one of the patients a hard, black dacryolite was found. The interesting feature was the difference in the histologic picture of the sacs. In this first case, the pigment was found on the elastic fibres and in the inflammatory tissue. In the second case, the pigment was deposited in the basal membrane of the epithelium and in the star-shaped connective tissue underneath. Ultra-violet spectral analysis of the dacryolite revealed the following constituents: Ca, Ag, Mg, Fe, P, Al, Cu, Na, and possibly Si. (4 illustrations.) Ray K. Daily.

Iribas, Gregorio. **Adrenalin in narrowing of the lacrimal passageways.** Arch. de la Soc. Oft. Hisp.-Amer., 1945, v. 5, March, pp. 206-207.

The author cites the advantage of the use of adrenalin to shrink the mucosa before probing for stenosis of the nasolacrimal duct.

J. Wesley McKinney.

Lutman, F. C., and Favata, B. V. **Keratoconjunctivitis sicca and buccoglossopharyngitis sicca with enlargement of parotid glands.** Arch. of Ophth., 1946, v. 35, March, pp. 227-240.

Sjögren, in 1933, described a chronic disorder characterized by reduction in the secretions of the lacrimal and salivary glands with accompanying keratoconjunctivitis sicca, and dryness of the mucous membranes of the mouth and the upper respiratory system. A persistent enlargement of the parotid glands sometimes occured. The several publications of Sjögren on this subject have established the condition as a syndrome that now bears his name.

The numerous complications in the development of this disease do not occur in every patient, but the high incidence of each warrants the belief that they involve many of the body's systems, and that the ocular manifestations are but a part. In the presence of a chronic inflammation of the lacrimal gland, the forms of local treatment that have been suggested must be considered of no more than palliative value.

Two cases of Sjögren's syndrome are reported in detail. The microscopic pathologic changes in a lacrimal gland and the parotid glands in one case are described. Some of the complications and possible causes of this disease are discussed. A clinical resemblance to advanced chronic ariboflavinosis is noted. R. W. Danielson.

Lyle, T. K., Cross, A. G., Simpson, J. F. **Dacryo-cysto-rhinostomy.** Brit. Jour. Ophth., 1946, v. 30, Feb., pp. 102-119.

Fifty cases of dacryo-cysto-rhinostomy are analysed and the results found to be uniformly satisfactory. The operation, which is much like the Toti-Moser procedure except that the skin incision is placed more anteriorly, is described in detail with the help of good diagrams. Lipiodol injection for X-ray study and a careful nasal examination are always done before surgery. General anesthesia is preferred. The authors believe that a simple excision of the sac is entirely insufficient. The surgical cooperation of an ophthalmol-

ogist and a rhinologist is strongly urged. The only contraindications to the operation are definite absence of the sac and irreparable obstruction of the lower canaliculus. (7 illustrations).

Morris Kaplan.

Niemeyer, Waldemar. **Autoplastic dacryorhinostomy.** Arquivos Brasileiros de Oft., 1945, v. 8, Dec., pp. 181-185.

The technique described was first published by the author at the second Argentina Congress of Ophthalmology in 1940.

After the usual preparation, the nasal bone is trephined, the opening being beveled so as to make it larger toward the nasal fossa. With a Deschamps hook or other instrument, a silk thread number 2 or 3, more or less 20 to 25 cm. long, is passed through the slit lower canaliculus and the bony gap, and is brought out through the corresponding nasal passage. A flap of labial or buccal mucosa is prepared, measuring (after dissecting away the fatty tissue) 12 to 14 mm. in length by 12 mm. at the base and 10 mm. at the upper side (slightly trapezoid form).

With three stitches of fine chromic catgut, this flap is sutured in its length to form a sort of sleeve, with the raw surface outside. The silk thread which served as a guide is pushed into the nasal extremity of the tube so as to hold the flap in its definite position, the proximal end being united to the distal extremity of the canaliculus. A small chromic catgut suture is sufficient to fix the proximal extremity of the new canal to the distal extremity of the canaliculus. Care must be taken to make the periosteal resection larger than the bony opening; and also to avoid leaving a bony fragment in the canal. The tube of mucosa should not be longer than necessary for good union between the end of the canaliculus and the mucosa. Good hemostasis is desirable. (10 figures.)

W. H. Crisp.

Turtz, C. A. **Use of penicillin in acute dacryocystitis.** Amer. Jour. Ophth., 1946, v. 29, June, pp. 723-725.

15

TUMORS

Godtfredsen, Erik. **Eye and nerve symptoms in connection with cranial chordomas.** Acta Ophth., 1943, v. 21, pt. 3, pp. 224-236.

The literature which contains 24 reports of cases is briefly reviewed and a case is reported. The initial symptom in the 57 year-old man was unilateral impairment of hearing, followed three years later by abducens paralysis and trigeminal neuralgia. The patient died three and one-half years after the onset of symptoms, and the autopsy revealed a diffuse destruction of the base of the skull and liver metastases. The diagnosis of these tumors is very difficult, and the first symptom frequently results from involvement of the ocular nerves. A diagnosis is possible only in chordomas that proliferate into the naso-pharynx and are accessible to biopsy. (Illustration.) Ray K. Daily.

Lisa, J. R., and Givner, I. **Melanoma of the skin with intraocular and orbital metastases.** Arch. of Ophth., 1945, v. 34, Nov.-Dec., pp. 422-424.

Melanoma of the eyes or orbits is usually a primary disease and seldom occurs as a metastasis. The authors report a case of metastasis from a primary tumor of the posterior chest wall. Innumerable masses of tumor were found scattered over the body.

At autopsy widespread metastases were found in all the organs except the testes and the left epididymis. There were very numerous tumors in the brain. In each eye there was retinal detachment due to choroidal metastases. Orbital masses were also present. (5 photomicrographs.)

John C. Long.

Mathewson, W. R. **Meningioma of the tuberculum sellae with bitemporal hemianopia.** Brit. Jour. Ophth., 1946, v. 30, Feb., p. 92-102.

A patient with a prechiasmal meningioma and irregular bitemporal hemianopia is described. At operation a very irregular growth of the tumor was found which was the basis of the irregular perimetric findings. Despite some obvious optic atrophy, the patient made a very satisfactory recovery. (10 field charts).

Morris Kaplan.

Páez Allende, Francisco. **Recklinghausen's disease (neurofibromatosis of bulbar conjunctiva).** La Semana Méd., 1946, v. 53, March 28, pp. 572-579.

The patient was a female twin aged 18 years. There was a large tumor formation of the bulbar conjunctiva, histologic analysis of which showed neurofibroma. The patient showed also bodily asymmetry, cutaneous tumors, partial alopecia of the hairy scalp on the side of the affected eye, skeletal lesions, intracranial involvement, and epilepsy. It was planned to extirpate the conjunctival tumor, with insertion of buccal mucosa to fill the breach thus left in the conjunctiva. (7 figures, bibliography.) W. H. Crisp.

Skydsgaard, Henning. **Benign rhinopharyngeal tumor (meningioma) with eye symptoms of intracranial origin.** Acta Ophth., 1944 ,v. 21, pt. 4, pp. 287-294.

A man, 57 years of age, developed amaurosis with papillary atrophy in the right eye, and a loss of light reaction in the left eye, within a period of ten weeks. A diagnosis of retrobulbar neuritis was made. Ten months later total ophthalmoplegia set in in the right eye, and the visual acuity of the left eye became impaired. Three months later a temporal quadrant hemianopsia for red was found in the left eye, and the ophthalmoplegia cleared up. At this time X-ray studies of the skull were suggestive of sclerosis of the internal carotid. Nasal obstruction led to a rhinological examination 17 months after the onset of the visual difficulties and a naso-pharyngeal tumor as large as a plum was found and removed. The microscopic diagnosis was meningioma. Nine months after removal of the tumor the ocular condition was unchanged.

Ray K. Daily

16

INJURIES

Dwek, Joseph. **Ecchymotic mask.** J. Internat. Coll. Surgeons, 1946, vol. 9, March-April, pp. 257-265.

Ecchymotic mask is a syndrome that develops after traumatic compression of the chest and abdomen, and is characterized by a cyanotic discoloration of the skin of the face, neck, upper part of the chest, and of the conjunctiva. The lids are edematous. A triangular subconjunctival hemorrhage with the base toward the caruncle and its apex toward the pupil is visible in the palpebral opening. Exopthalmus is present and results from intraorbital hematoma. Mydriasis may be found with a loss of pupillary reaction to

light. Compression of the optic nerve may lead to loss of light perception. Retinal hemorrhages usually lead to atrophy of the disc. Vitreaus hemorrhages have been reported.

I. E. Gaynon.

Haik, G. M. **The management of intraocular foreign bodies in military practice.** Amer. Jour. Ophth., 1946, v. 29, July, pp. 815-825. (6 figures, 1 table, references.)

Pavisic, Z. **Early transplantation of mucous membrane from the mouth and conjunctiva in burns of the eye.** Ophthalmologica, 1944, v. 108, Dec., pp. 297-304. (See Section 5, Conjunctiva.)

Porcher, P. and Gilles, E. **A method of localizing opaque intraocular foreign bodies.** Ann. d'Ocul., 1945, v. 178, Aug., pp. 345-357.

Six roentgenograms are taken of the eye in the following positions; forward, right, left, up, down, and two oblique. For these exposures two films, 6 by 15 inches, are used. The apparatus consists essentially of a localizing tube which contains a plexiglass aluminum-coated mirror observation tube. Attached to it is a metal plate with a thumb screw for raising or lowering a lead ring 24 mm. in diameter, which is contained in a plastic holder. A wire with a long and short arm which shows the position of the eye on the plate projects through a hole exactly in the center of the lead circle. The long arm is attached to an elastic cord which corresponds with the patient's line of fixation. The patient's head is firmly fixed in a holder and the apparatus contains a plate which rests against the nasal wall of the orbit. The basic principle involved is a triangulation of the lead circle, the wire meridian line of fixation and the intraocular foreign body. The author claims that the results obtained with this method compare favorably with the more complicated Sweet and other methods. Chas. A. Bahn.

Prado, Durval. **Strange ocular complication caused from intoxication by sulfadiazine.** Arquivos Brasileiros de Oft., 1945, v. 8, Dec., pp. 169-172. (See Section 5, Conjunctiva.)

Saint-Martin, R. **A new case of bitemporal traumatic hemianopsia.** Ophthalmologica, 1943, v. 105, June, pp. 290-298.

The author describes a case of bitemporal traumatic hemianopsia with considerable contraction of the nasal portion of the fields which occured after a fracture of the left frontal bone. The patient, who was examined 11 months after the accident, had a distinct atrophy of the optic nerve and pallor of the nasal segment of the disk of the right eye. There also existed a complete anosmia and an anesthesia of the skin in the region of the right external nasal nerve. The X-ray picture showed a lesion of the left frontal bone at the level of the left minor ring of the sphenoid.

Posttraumatic bitemporal hemianopsias are rare therefore the author briefly reviews the literature and discusses the theories and experiments concerning the mechanism of these injuries. (References.)

Alice R. Deutsch.

Stewart, F. J., **Plastic artificial eyes.** Proc. Roy. Soc. Med., 1946, v. 39, March, p. 251.

The author feels that mass-produced

plastic ocular prostheses are adequate in the average socket. Despite the occasional idiosyncrasy to methyl methacrylate (one in 10,000), and the ease with which these eyes are scratched, they are distinctly better than glass eyes. Experiments are in progress on hardening the plastic surface.

Benjamin Milder.

Thüer, E. **Examination of a bulbus after catepillar hair injury.** Klin. M. f. Augenh., v. 109, May-June, 1943, p. 350.

Injuries from caterpillar hair especially from specimens of the Bombyx and Euproctis families are always a serious and not infrequent occurrence. Thüer reports six cases observed in the Zürich University Eye Hospital. In the most favorable case the patient was admitted to the hospital three days after the injury; the eye recovered in six weeks without recurrences even though all of the hair could not be removed. The lesion was accompanied by the formation of vesicles in the cornea. In all other cases the posterior portions of the globe were involved. The caterpillar hair, which consists of chitin and has minute sharp barbed hooks, wanders into deeper tissues and causes not only mechanical but also toxic damage. The inflammatory process flares up at intervals that varied from 1½ up to 18 years. In no case was removal of all hairs possible. Those embedded in the conjunctiva were removed by means of forceps or excision. Once an iridectomy was performed. In four eyes considerable loss of vision resulted, and two were enucleated. In five of the six cases the injury was a result of youthful frivolity; only one could be regarded as an industrial accident. One eyeball was examined histologically in serial sections. In 54 nodules 61 fragments of hair were found distributed in the conjunctiva, sclera, iris, ciliary body, vitreous body, choroid, and optic disc. Caseation, as in tuberculosis, was not found in any of the nodules. Giant cells were not frequent and usually had their nuclei peripherally placed. Signs of absorption were noted but rarely. In only three of the 54 nodules were no fragments of hair found. (4 microphotographs, references.)

F. Nelson.

17

SYSTEMIC DISEASES AND PARASITES

Bailliart, P. **Clinical aspect of ocular tuberculosis.** Ann. d'Ocul., 1945, v. 178, Nov., pp. 469-489.

Ocular tuberculosis is an affection of adolescence and more often occurs in boys. Primary infection is rare, its prognosis is often favorable, and it is best treated by means of thermocautery, tuberculin, and radiotherapy. In animals secondary glandular involvement from conjunctival infection may occur without a visible primary conjunctival lesion. Ocular infection secondary to a lacrimal lesion that has extended from the nose is rare. Ocular tuberculomas frequently involve the anterior portion of the uvea; often they are highly inflammatory and vascular, clinically resemble sarcoma, and not infrequently necessitate prompt enucleation. A milder form, nodular iritis, is only slightly inflammatory. Miliary tuberculosis which is due to a bacillemia, occurs in the uvea and retina, and varies widely in its severity and duration. This variation depends not only

on the quantity and virulence of the organisms but also on ocular and extraocular allergy. Intraocular infection may extend to the meninges. Phlyctenular keratoconjunctivitis is essentially an allergic reaction which may be accompanied by secondary infection, is usually bilateral, and occurs most frequently in infancy and puberty. Basically, it is an impetigo caused by an antigen that is most frequently tuberculous, and less frequently originates in other organisms, fats or horse serum. The offending antigens are probably secreted in the tears. Tuberculous episcleritis, sclerokeratitis, and interstitial keratitis are also usually allergic reactions, but of longer duration, and recovery is often incomplete. This is especially true of the deep type of scleritis. Among intraocular conditions which pathologically resemble tuberculous lesions are retinal periphlebitis with vitreous hemorrhages, retinal angiomatosis, Coate's disease, and the syndromes of Heerfordt and Besnier-Bock. Among the diagnostic features noted in tuberculous iridocyclitis are nodules, large gray precipitates, a slow course, folliculosis, lymphocytosis, cicatrization, and incomplete healing. Pigmentation is less marked in tuberculous choroidal lesions than in those caused by syphilis. Pin point granulations in miliary lesions are diagnostically suggestive, as is a dirty gray color. Tuberculosis in antecedents and associates often affords a diagnostic clue. Calcified pulmonary glands, especially those with cloudy margins, may be evidence of slight activity. The uveal tract is especially sensitive to involvement from slight extraocular tuberculous disease. Tuberculous patients usually have vascular hypotension. Unfortunately tuberculotoxins have not been identified in the blood.

In hospitals and sanatoria for the tuberculous, ocular tuberculosis is very rare, and its severity is roughly inversely proportionate to the severity of the extraocular lesions. This apparent antagonism of local and general tuberculosis exists in 60 percent of patients with ocular tuberculosis. The stages of tuberculosis are frequently correlated with characteristic ocular manifestations; in the primary or infective stage with phlyctenular disease; in the secondary stage recurrent phlyctenular keratitis, deep keratitis, scleritis, and especially uveal inflammations. In the tertiary stage in which the basic foci of the disease are walled off ocular involvement is rare. Chas. A. Bahn.

Cockburn, C. **Ocular cysticercus cellulosae.** Brit. Jour. Ophth., 1946, v. 30, Feb., pp. 65-74.

The patient was a Jugo-Slav in a British hospital in Italy who complained of defective vision in the right eye. This consisted of a gray haze for about six weeks, then suddenly a well defined object "shaped like a pear leaf" became noticeable. It possessed a stem which had a knob at its end and constantly changed its position "like a serpent's head searching for something." The patient made several drawings of his visual impression that are amazingly accurate pictures of the parasite found. Under atropine mydriasis the entopic image was reduced almost half in size.

Examination revealed a completely spherical, brilliantly colored cyst in the lower portion of the very fluid vitreous to which a miniature tapeworm complete with scolex possessing hooks and suction discs was attached. The head

moved about constantly. Nearby was an area of acute choroiditis through which the cyst had apparently ruptured though no retinal separation was present.

The cyst was delivered with the aid of a scleral hook through a scleral section. There was considerable loss of fluid vitreous. After a stormy convalescence the eye became quiet and perceived light. The parasite was taenia solium. No adult infestation was present in this man. The ovum apparently had been swallowed, had penetrated the intestinal wall and entered the portal circulation, the arterial system, and finally the choroid by way of the ophthalmic artery. Morris Kaplan.

Desvignes, P. **Aneurysms of the intracranial segment of the internal carotid.** Arch. d'Opht., 1945, v. 5, no. 3, p. 303.

This comprehensive review with illustrative case reports is difficult to abstract. The author stresses the fact that ocular symptoms commonly bring this condition to the attention of the ophthalmologist, upon whom rests the burden of early diagnosis, although treatment is necessarily neurosurgical. He also stresses the important role that cerebral arteriography plays in the diagnosis.

Important points discussed include (1) anatomical variations of the carotid, (2) clinical signs of aneurysm including ophthalmoplegia, meningeal hemorrhage, and opticochiasmic compression, all illustrated by case reports, (3) evolution, and (4) therapy. The author discusses in detail the various eye signs and mentions that a progressive exophthalmos which can be pulsating in type may occur in certain cases. Radiography generally shows erosions of the anterior clinoid processes and abnormal vascular shadows with or without arterial calcification.

Focal symptoms depend upon the anatomical localization of the aneurysm. If it is in the cavernous sinus, unilateral loss in visual acuity, diplopia, unilateral headaches, facial neuralgias, corneal anaesthesia, and sometimes slight exophthalmos may result. If the aneurysm ruptures, the characteristic picture of arterio-venous aneurysm with pulsating exophthalmos may result. If the aneurysm is localized at the termination of the internal carotid, or on one of its terminal branches, there may be violent retro-orbital headaches, sometimes with vomiting and loss of consciousness. Sudden death is the usual end result. If the aneurysm produces a compression of the chiasm, unilateral loss in visual acuity is the common symptom but bitemporal hemianopsia may supervene. If the lesion is left untreated blindness results.

Possibilities of medical treatment are discussed, including injection of sclerosing solutions, but surgical therapy offers more hope. Pulsating exophthalmos in particular has been successfully treated by carotid ligation and the author considers this procedure as life saving in the prevention of aneurysmal rupture. Internal carotid ligature is useless, however, when the terminal branches of the artery are involved, and direct surgical intervention may be necessary. Phillips Thygeson.

Falls, H. F., and Beall, J. G. **Ocular varicella.** Arch. of Ophth., 1945, v. 34, Nov.-Dec., pp. 411-412. (See Section 6, Cornea and sclera.)

Gördüren, Süreyya. **A case of acro-**

cephaly. Göz Klinigi, 1946, v. 3, no. 4, pp. 53-62.

The writer describes a young patient who had been suffering from acrocephaly, nystagmus, exophthalmos, divergent strabismus, and a primary atrophy of the optic nerve.

A projection on the occupital region of the skull, as large as a goose's egg, accompanied the acrocephalic change. It is assumed that the closure of the lambdoidal suture was retarded in consequence of which the skull, having no resistance against the intracranial pressure, became malformed.

An accompanying anosmia may have been caused by presssure on the olfactory nerve or as a result of a specific meningitis or a pachymeningitis. The Wassermann reaction of the blood was three plus. I. E. Gaynon.

Kayser, B. **Distant effect on both eyes originating from a focus in the mandible with unilateral hemianopsia. (Self-observation.)** Klin. M. f. Augenh., 1943, v. 109, May-June, p. 413.

Kayser noticed a horizontal unilateral hemianopsia developing slowly and insiduously in his hitherto normal and not irritated left eye. The scotoma was absolute and objective but did not interfere much with vision since the macula was not affected, but a pulsation synchronous with the heart beat was present in the eye. Two weeks later there was sudden malaise, great fatigue, and severe bilateral disturbance of the function of the eyes. Reading, writing, and fusion became impossible. The supraorbital rim and region of the frontal sinus were tender to touch. He had vertigo and lightheadedness and his gait became spastic. Internal and rhinological examinations were negative. Bed rest gave no noticeable relief. Two months later a sore tooth in the lower jaw was treated for granuloma. The symptoms disappeared rapidly. F. Nelson.

Öztürk, M. H. **A case of Behçet's disease.** Ophthalmologica, 1944, v. 108, Dec., pp. 288-292.

Behçet's disease is a complex of symptoms characterized by aphthous ulcers in the mouth, ulcerations on the genitals, erythematous nodules on the legs (erythema nodosum), and by keratitis, iritis, and hypopyon in the eye. These changes do not always occur concurrently, but may be separated by months or even years. Behçet who described the disease a few years ago assumed that a virus is the causal agent. The author describes a patient, observed in Istanbul, who gave a history of attacks of fever and ulcerations in the mouth and on the genitals. The eye symptoms occurred later with edema and opacification of the cornea, hypopyon, later hyphema, and secondary glaucoma. Only one eye was involved and the symptoms varied in intensity from time to time. Phlebitis and erythema of the legs were also present. Treatment with sulfonamides and vitamins B and C was unsatisfactory. Max Hirschfelder.

Peter, A. L. **Oxycephaly associated with Klippel-Feil syndrome and other skeletal defects.** Amer. Jour. Ophth., 1946, v. 29, June, pp. 685-693. (18 figures, references.)

Siniscal, A. A. **Oculograndular tularemia.** Amer. Jour. Ophth., 1946, v. 29, June, pp. 698-710. (See Section 5, Conjunctiva.)

Steenken, W. Jr., Wolinsky, E., and

Heise, F. H. **Treatment of experimental ocular tuberculosis with promin.** Am. Rev. Tuberc., 1946, v. 53, Feb., p. 175.

In order to evaluate the therapeutic effect of promin (a derivative of diamino-diphenyl-sulfone) on tuberculosis, the authors employed direct clinical observation of tuberculous lesions of the eye. Suspensions of tubercle bacilli were injected into the anterior chamber of the eyes of guinea pig. The resulting infection was graded into five groups according to severity of the findings.

One group of vaccinated guinea pigs in whom tuberculous ocular infection had been produced was treated with promin administered orally, while another group received the drug orally and locally (by instillation into the conjunctival sac). In both these groups, there was an initial allergic response, followed by improvement for one week, then a gradual increase in severity to grade 3 infection. Similarly infected vaccinated guinea pigs, that did not receive promin, were found to have more severe ocular infection (grade 4). Control animals that had not been vaccinated beforehand with tubercle bacilli, and had not received promin, developed a grade 5 reaction (corneal necrosis and perforation), and died.

The experiment demonstrated that promin was of value early in the course of tuberculosis, as evidenced by the clinical observations and corroborated by the autopsy findings at the conclusion of the 295-day experiment. No cures were effected but there was a definite retardation of the tuberculous lesions. Benjamin Milder.

Toledo, Renato de. **Ocular manifestations of the avitaminoses.** Arquivos Brasileiros de Oft., 1945, v. 8, Dec., pp. 173-180.

A general review of this subject under the headings of avitaminosis A, light sensibility and adaptation to dark, complex B, vitamin C, vitamin D, and vitamins E and K.

W. H. Crisp.

Vanýsek, J. **Conjunctivo-urethro-synovial syndrome of Feissinger and Leroy or Reiter's disease.** Časopis Lékařů Českých, 1946, v. 85, March 15, pp. 343-347. (See Section 5, Conjunctiva.)

18

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Barnett Albert. **Plato's conceptions of light and sight.** The Optician, 1946, v. 111, May 10, pp. 289-292.

The article consists of quotations from the "Republic." Plato gives many examples of what we today would call the phenomena of light and dark adaptation, and states "that the bewilderments of the eyes are of two kinds, and arise from two causes either coming out of light, or from going into the light." In Book X, Plato discusses the refracting property of water because of which an object that appears straight when looked at out of the water seems broken when in the water. In the discussion of visual beams, sight is an internal fire that flows from the eyes in a smooth and dense stream and passes through the pure element. When this combines with external light, the stream of vision reaches the soul and causes that perception called sight. He also discusses reflection and the formation of images in mirrors.

Colors are a flame which eminates from any part of the body and has particles corresponding to the sense of sight. Particles having the same size as sight are transparent. White dilates the visual ray and black contracts it. The formation of colors is discussed as caused by the various fires, the proportions of which give the various hues. There is an intermediate hue of red. Red and white make auburn. Red, white, and black make purple.

I. E. Gaynon.

Bonhomme, E., and Agatston, H. **Belgian ophthalmology during the war.** Amer. Jour. Ophth., 1946, v. 29, June, pp. 674-684. (1 table, references.)

Fortner, E. N. **A Public School program for the visually handicapped in Oregon.** Sight-Saving Review, 1945, v. 15, Winter, pp. 212-220.

School teachers are trained to test vision by means of the Snellen chart. All children whose visual acuity is 20/40 or less, or who have asthenopia or strabismus, are referred to their family doctor or to a clinic. The Division of Special Education provides textbooks with clear type where needed. During the past two years 2700 children have been examined in the educational clinics, and 150 of them have needed books with large type. I. E. Gaynon.

Hilliard, R. **Public assistance for the blind in Illinois.** Illinois M. J., 1945, v. 88, Oct., p. 199.

The Illinois Public Aid Commission has had the responsibility for the administration of the Blind Assistance Act since its passage in June of 1943. This act provides assistance to needy blind persons and its provisions are such that Social Security funds are made available to meet 50 percent of the cost up to a maximum of $40.00 per month.

A committee was appointed to advise on the social and medical aspects of the program.

The definition of blindness formulated by the Sub-committee on Ophthalmology reads as follows: "In terms of ophthalmic measurement, central visual acuity of 20/200 or less in the better eye, with correcting glasses, is generally considered economic blindness. A field loss in which the visual field efficiency is reduced to 30 percent or less may be considered equally disabling, as may certain ocular conditions which do not necessarily involve visual acuity or peripheral field loss, but which constitute severe visual handicaps."

The applicant must furnish evidence of financial need, verification of age, and proof of blindness. The applicant must have reached the age of 18 years and must be examined by an ophthalmologist.

The examiner reports his findings on a form which the Commission supplies and mails it to the Supervising Ophthalmologist who reviews and evaluates the findings in terms of the definition before he certifies that the applicant is blind.

The assistance is not always financial. The applicant may be given medical care or help in social and economic rehabilitation.

The Commission has worked out cooperative agreements with the Division of Visitation of the Adult Blind; Division of Vocational Rehabilitation; Illinois Eye and Ear Infirmary; Cook County Hospital; the sheltered workshop of the Department of Public Wel-

fare; Trachoma Clinics; and many private social and welfare agencies.

Theodore M. Shapira.

Jones, Tom. **Via optica.** Quart. Bull. Northwestern Univ. Med. School, 1946, v. 20, Spring, pp. 71-76.

The writer has been concerned for years with the production of visual teaching media and thinks one should exploit this method of communication of knowledge and information. We are still clinging to the traditional lecture hall methods; experience has shown that these methods are insufficient and time consuming as compared to the newer visual and audio-visual technique which can be integrated towards a fuller and more lasting understanding. Models, charts, photographs, drawings and all worthy graphic material should be kept displayed in classrooms, halls, or wherever suitable space permits. The growth of visual education has imposed upon the planners of our medical schools the need for providing space for the function of the graphic media of medical education and for providing facilities for the expression of the language of vision. Students' capacity of absorption varies. Some require more time than others to comprehend and coördinate the material of their course. A variety of well selected visual aids placed where they can be seen becomes an environmental factor which silently and unobtrusively contributes to their wider understanding. Students like to visit these interesting places where they can solidify and expand their class-room studies; they are grateful for the opportunity to observe and contemplate at leisure material that will supplement and illuminate what they learn in the classroom and laboratory. Two figures accompany the essay which illustrate some aspects of visual instruction.

Melchiore Lombardo.

Knudtzon, Kartsen. **Social-medical experiences from the school for children with defective vision in Copenhagen.** Acta Ophth., 1940, v. 20, pt. 2, pp. 194-204.

These data are compiled in the hope that the information may be helpful to a committee that is at work to expand the program. A statutory provision for special education for all handicapped children becomes effective in April, 1948.

Ray K. Daily

Lee, O. S. **Chinese native ophthalmology.** J. Iowa M. Soc., 1946, v. 36, March, pp. 91-98.

This paper covering the history and conceptions of Chinese ophthalmology is not suitable for condensation. Some of the more striking data follow. Needling was supposedly originated in 2679 B.C., and the first work on this subject was published in 250 B.C. Through the influence of Buddhism, Indian medicine was introduced into China. The three main texts of the era included a description of conjunctivitis, cataract, night blindness, glaucoma, trichiasis and operation for cataract.

The Chinese concept of the functions of the organs of the body and their ideas on the principles and practice of medicine are based on the theory of cosmogony, which is active today. There is no literature dealing with the anatomy of the eye. Ocular disease is always associated with disease of the viscera and internal organs. Diseases of the eye are divided into diseases of the internal eye, of the external eye, and of the corneal membrane. The causes and treatment of pterygium,

hypermetropia, trachoma, redeye, glaucoma, pannus, iris prolapse, interstitial keratitis, trichiasis, blepharitis are illuminated from the Chinese point of view. The surgery for pterygium and cataract, and optical glass came into use between 1766-140 B.C. The notation for the refractive power of lenses was not in diopters, but according to the Chinese zodiac. Plus lenses were used only for presbyopia. They were not prescribed for the young even if needed, for the young did not dare to use the same lenses as their elders.

I. E. Gaynon.

Podestà, H. **The psychophysical foundations of the Aristotelian doctrine of the sense perceptions with special regard to the sense of vision.** Klin. M. f. Augenh., 1943, v. 109, Jan.-Feb., pp. 108-118 and March-April, pp. 253-265.

The author presents a very elaborate and interesting historical treatise on the philosophical development and structure of Aristotle's doctrines of sensual processes. F. Nelson.

Stock, F. E. **Blindness in an urban center in Nigeria.** Brit. M. J., 1946, April 6, pp. 525-526.

A census of the blind was made in the town of Yerwa in September 1944. Among 35,000 persons there were 497 cases of blindness. Of all persons 37 percent became blind before the age of 10 years.

Of 254 persons examined, 103 were made blind by smallpox. Conjunctivitis (keratomalacia due to vitamin A deficiency) is very common. Leucoma and panophthalmitis were the cause of 103 cases of blindness. About two percent of the population is blind and four fifths of the blindness could have been prevented by compulsory vaccination and an adequate diet. I. E. Gaynon.

Voisin, J. **The ophthalmologist and the present laws relating to military pensions.** Arch. d'Opht., 1945, v. 5, no. 3, p. 332.

This report deals with the relationship of the ophthalmologist to the French pension laws of 31 March, 1919, and the modifications of 1919, 1941, and 1942. There is a brief outline of those laws which concern service-connected eye lesions.

Phillips Thygeson.

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ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Gronvall, Herman. **Two cases of Draganesco's cutaneo-auricular reflex.** Acta Ophth., 1944, v. 21, pt. 4, pp. 267-270.

In 1929 Draganesco described a reflex that is characterized by a lifting of the auricle in response to mechanical stimulation of the skin about the ear, or half of the face or head. It is normal in rabbits, and is considered a phylogenetic relic in man. Gronvall describes two patients in whom this reflex could be elicited principally from the skin about the orbit. Ray K. Daily.

Rønne, Henning. **The structure of the human visual pathway.** Acta Ophth., 1943, v. 21, pt 3, pp. 137-190.

This is a compilation of published material, gathering the scattered data into a monograph. (22 illustrations.)

Ray K. Daily.

NEWS ITEMS

Edited by DONALD J. LYLE, M.D.
904 Carew Tower, Cincinnati 2

News items should reach the editor by the twelfth of the month

DEATHS

Dr. James Cornelius Braswell, Tulsa, Oklahoma, died May 31, 1946, aged 53 years.

Dr. Grady Edward Clay, Atlanta, Georgia, died July 11, 1946, aged 56 years.

Dr. Robert Lewis Crockett, Oneida, New York, died May 27, 1946, aged 70 years.

Dr. Edward Keith Ellis, Boston, Massachusetts, died June 7, 1946, aged 66 years.

Dr. Frederick James O'Conner, Fayetteville, New York, died March 29, 1946, aged 62 years.

MISCELLANEOUS

The National Society for the Prevention of Blindness announces a three-day conference, November 25, 26, and 27, 1946, at the Hotel Pennsylvania, New York.

During September and October, a series of meetings are being held in the Department of Ophthalmology, University of Glasgow. The general arrangements are similar to those for the series held a year ago. The program includes: On September 11th a paper on "Irregular dominance in hereditary nystagmus," by Prof. W. J. B. Riddell; on September 18th, a paper entitled "Etiology and treatment of paralytic squint," by Dr. W. O. G. Taylor.

Dr. J. B. Gaylor will speak on September 25th. His paper is on "Electroencephalography in retinal disease." On October 2d, Mr. John Foster will present a paper entitled "An ophthalmic tour of Switzerland." Dr. Michaelson will discuss "Proptosis and exophthalmos" on October 9th, and on October 16th, Professor Loewenstein will give a paper on "Phakomatoses."

The meetings are open to all medical practitioners and senior students interested in ophthalmology. Tea is served after the paper has been read, and a discussion follows.

A unit has been established to administer the new New York State ophthalmic law requiring, for the first time, the licensing of persons engaged in dispensing eyeglasses, spectacles, and lenses, according to the department of education in the New York Times, July 15th. The new unit is in the department's bureau of qualifying certificates and professional examinations. The commissioner of education has appointed an advisory board to assist in administering the law, consisting of: Dr. Walter Hipp, ophthalmologist, 140 East Fifty-Fourth Street, New York; Harlow Fuller, optometrist, Syracuse; Henry B. Carpenter, optician, Guild of Prescription Opticians of America, Inc., Syracuse; Edward J. Boyes, optician, 659 Lexington Avenue, New York; Walter A. Blocker, optician, 604 Madison Avenue, New York.

Persons engaged in ophthalmic dispensing must be licensed by July 1, 1947. Those who have been engaged in ophthalmic dispensing for three years before enactment of the law, April 10, 1946, may qualify for licenses by submitting evidence that they were thus principally engaged in the state for at least that period and evidence of good moral character. The period of filing is extended beyond July 1, 1947, for war veterans who were ophthalmic dispensers for not less than three years before they entered the armed forces. After July 1, 1947, a candidate for the required examination must present evidence of an approved secondary school course and the completion of either a one-year course of study in a school of ophthalmic dispensing registered by the state education department or one year of training or experience in ophthalmic dispensing under the supervision of an ophthalmic dispenser, physician, or optometrist. Thus far no schools of ophthalmic dispensing have been registered with the department, it is reported.

SOCIETIES

At a recent meeting of the Pennsylvania Academy of Ophthalmology and Otolaryngology, Dr. Thomas F. Furlong, Jr., Ardmore, was elected president. Among other officers are: Dr. Benjamin F. Souders, Reading, secretary, and Dr. William E. Grove, Johnstown, treasurer. The 1947 meeting of the society will be at the Hotel Hershey, Hershey, in April.

PERSONALS

Dr. Bertha A. Klien has been appointed associate professor of ophthalmology at Northwestern University Medical School. She has been serving as associate professor of ophthalmology at the University of Illinois College of Medicine.

Dr. James N. Greear, Jr., 1740 M. Street, N.W., Washington, D.C., has been named as consultant in ophthalmology to the Secretary of War.

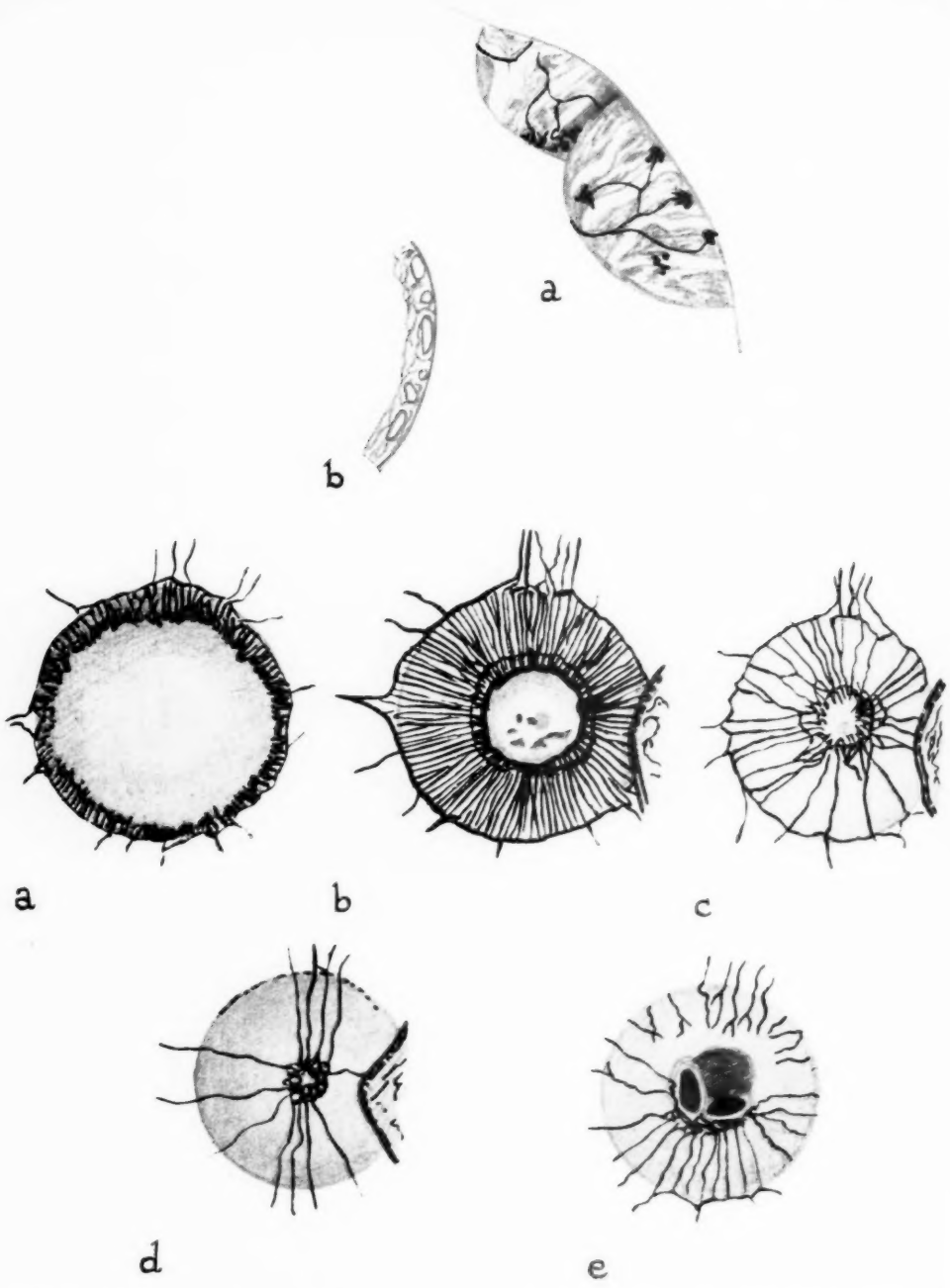

FIG. 9 (MANN ET AL.) A, A FOLD OF EDEMATOUS CONJUNCTIVA SHOWING DILATED LYMPHATICS AS FLAT PALE BANDS NOT IN ANY PARTICULAR RELATION TO THE CAPILLARIES (WHICH SHOW PETECHIAE). B, OPTICAL SECTION OF SWOLLEN CONJUNCTIVA, SHOWING LYMPHATICS AS OPTICALLY EMPTY FLAT OVAL TUBES.

FIG. 10 (MANN ET AL.) STAGES IN VASCULARIZATION AND DESTRUCTION: A, VESSELS INVADING EDEMATOUS CORNEA; B, VESSELS EXTENDING TOWARDS CENTRAL SLOUGH. C, CENTRAL MASS OF GRANULATIONS FORMING AS A RING AROUND CENTRAL SLOUGH; D, CENTRAL MASS OF GRANULATIONS PROJECTING AS A BLEB AFTER PUSHING OFF THE SLOUGH. THE FEEDING VESSELS ARE DISAPPEARING. E, TWO DESCEMETOCELES FORMED BY SEPARATION OF BITS OF THE CENTRAL SLOUGH BEFORE THE VESSELS HAVE REACHED IT.

UNIV. OF MICH.